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# JOURNAL OF BANGLADESH COLLEGE OF PHYSICIANS AND SURGEONS

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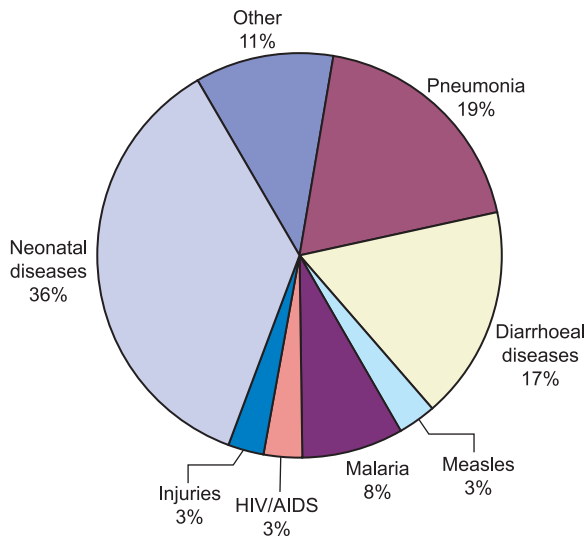
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## How Can We Afford to Save Our Children from Pneumonia – The Biggest Killer !

Pneumonia - the leading killer<sup>1,2</sup> still claims >29%<sup>1</sup> (including 10% neonatal death) of world's under five (U-5) annual deaths<sup>2-4</sup> totaling to ~3 million,<sup>1</sup> despite advances in the understanding of patho-physiology of child death.<sup>5</sup> Pneumonia alone kills more children than combined deaths due to AIDS, malaria, tuberculosis and measles.<sup>1,6</sup>

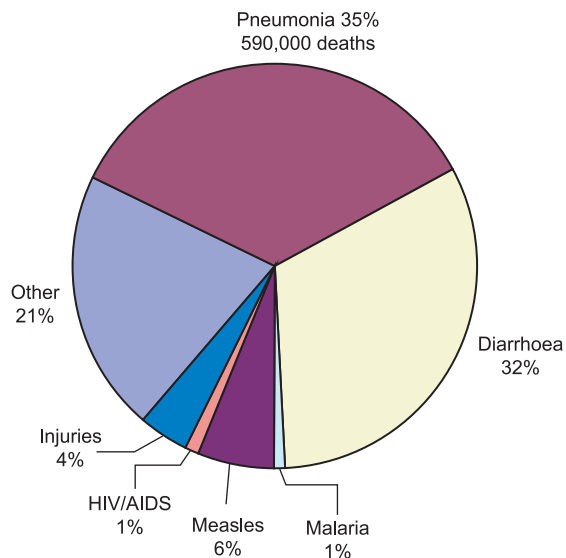


*Major causes of global under five mortality.  
Source: WHO. World Health Statistics, 2007*

Extensive activities took place on international health over the past decade<sup>6</sup> focusing renewed attention and possible interventions to reduce global burden of U-5 mortality and morbidity.<sup>5</sup> But, pneumonia remains neglected<sup>1</sup> with a little attention paid on to it<sup>1,6</sup> including essential research and vaccine trials.<sup>7</sup> As a result, worldwide U-5 pneumonia death still persists to be unacceptably high<sup>3</sup> particularly in least developed countries (LDC).<sup>2</sup> Global estimation revealed 150 million pneumonia episodes/year among U-5 children in developing countries, accounting for > 95% of all new cases worldwide, 11 to 20 million of which require hospitalization.<sup>8</sup> Around 19%<sup>3-4</sup> of these occur in mere 42 developing

nations<sup>5</sup> and remains the highest in South-East Asia region (SEAR).<sup>5,9</sup>

**Causes of Child Mortality in South East Asia Region**



Total average annual child deaths: 1,709,000

*Average annual mortality for children under 5 years excluding neonatal deaths, 2000-03*

While south Asian and sub-Sahara countries bear the burden of >half<sup>8</sup> of total U-5 pneumonia episode worldwide; <sup>3</sup>/<sub>4</sub><sup>th</sup> of these occur in mere 15 countries<sup>8</sup> - where Bangladesh ranks 4<sup>th</sup> with 6 million pneumonia cases.<sup>1, 8</sup> Incidence of ALRI (mostly pneumonia) related hospital admission among U-5 in rural Bangladesh is 50.2/child-year-observed.<sup>10</sup> Interestingly, U-5 mortality in Bangladesh though came down from 150 in 1965 to 68 in 2007,<sup>11-12</sup> pneumonia incidence still remains very high<sup>13</sup> (47% of U-5 illness<sup>14</sup>) including deaths (23%<sup>15,16</sup>) which may escalate even more if neonatal pneumonia death of ~10% is added.<sup>14-16</sup> Pneumonia due to *Strept. pneumoniae* alone kills 1 million U-5 children annually,<sup>17</sup> majority being among <2 years children of LDC, as WHO estimated recently.<sup>16, 17</sup>

There are several risk factors for high pneumonia incidence. Undernourished and Immuno-deficient<sup>18</sup> children, particularly who are not-exclusively breastfed remain at constant risk of developing pneumonia. Poor environment, indoor air pollution, overcrowding etc. may also play a role. Few other diseases also enhance the risk of pneumonia; like measles,<sup>19-20</sup> whooping cough,<sup>20</sup> etc., that are almost guarded by satisfactory EPI coverage.

It is difficult to identify a pathogen responsible for pneumonia death as most of the cases are not bacteremic and blood culture is insensitive. However, the innovative use of vaccine as a probe, showed that infection caused by *Streptococcus pneumoniae* (Pneumococcus)<sup>1,7,21</sup> and *Haemophilus influenzae* type b (Hib)<sup>16,22-25</sup> are the major causes of fatal childhood pneumonia which accounts for about 50% and 25%, respectively.

So, this emerging problem needs urgent attention towards its prevention and treatment in following two ways: first, proper case management with appropriate antibiotic therapy; and second, prevention by immunization with suitable vaccines. As appropriate vaccines are yet to be made available in 3rd world countries, Government of Bangladesh (GOB) has adopted programs like Acute Respiratory Illness (ARI) Control Program and subsequently Integrated Management of Childhood Illness (IMCI), developed by WHO and UNICEF, in creating awareness among the doctors, community health workers and care givers. The awareness mainly aimed at early case detection, quick referral and providing appropriate treatment. These activities also extended upto family level to empower the caregivers with sufficient knowledge in addressing common problems and deciding when to transport the child to a health care facility with more extensive supervised care. These measures proved to have significant impact in reducing U-5 mortality.

Current findings from hospital and community based studies underscored the need for preventive strategies as in adjunct to accurate clinical approach, improved diagnostic tools and perfect treatment regimen.<sup>5</sup> But these may hamper due to lack in gold standard in current algorithms (insufficient specificity) and lack in classic microbiological methods (poor sensitivity).<sup>5</sup> It is also essential to combine vaccines with particular emphasis on appropriate use of

antibiotics in pneumonia prevention programs.<sup>5, 26, 27</sup>

Meanwhile, Hib-vaccine trial conducted in different countries has shown considerable reduction in pneumonia incidence. GOB has recently introduced Global Alliance for Vaccine and Immunization (GAVI) - funded penta-valent vaccine (DPT, Hepatitis-B and Hib) with a target of not only reducing pneumonia deaths but also preventing ~90% of Hib-meningitis and others.<sup>16</sup> But, Bangladeshi children will still die of pneumonia due to a major pathogen, *Strept. pneumoniae*<sup>21</sup> which remains uncovered to several serotypes.<sup>16</sup>

Thus, in Bangladesh, where care seeking behavior remains poor and access to health care facilities is hard-to-reach, it is imperative that Govt. of Bangladesh should take prompt initiative to introduce pneumococcal vaccine under EPI though its formulation remains challenging as *Streptococcus pneumoniae* has 90 serotypes having geographically diverse and immunologically distinct characteristics.<sup>1, 7, 21-22</sup> Currently available 7-valent pneumococcal vaccine is customized based on the predominant serotypes of industrialized countries.<sup>17</sup> So, vaccines need to be customized according to our need by gathering further information about circulating invasive pneumococcal serotypes in Bangladesh and neighboring regions to facilitate accurate formulation of next generation pneumococcal vaccine which we expect to be available soon with the active support from GAVI, to help bring down U-5 pneumonia death significantly.

However a huge budgetary involvement in procuring such a vaccine remains a potential constraint. The GOB should seek financial/technical assistance from donors/UN agencies for this approach. However, a new vaccine grant by GAVI is only \$0.30/infant in the birth cohort/year or minimum \$100,000.<sup>28</sup> GOB essentially needs a defined strategy, a robust work plan and a strong political will to make such a vaccination procurement project, cost-effective and sustainable.

Anticipating the huge consumption of pneumococcal vaccine in Bangladesh where birth cohort is ~4%, it will be more cost-effective, if the GOB can start manufacturing this vaccine on its own capacity through transfer of technology. At the same time it will exert a positive impact in our national economy through industrialization and thus creating scope of employment, at least in part.

**Acknowledgement:**

Prof Samir Kumar Saha, *Professor of Microbiology, Dhaka Shishu Hospital*

(*J Bangladesh Coll Phys Surg 2009; 27: 1-3*)

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## Cervical Ripening: Comparative Study between Intracervical Ballooning by Foley's Catheter and Intravaginal Misoprostol Tablet

J FERDOUS<sup>a</sup>, NN KHANAM<sup>b</sup>, MR BEGUM<sup>c</sup>, S AKHTER<sup>d</sup>

### Summary:

*This study was designed to compare the effectiveness of misoprostol and Foley's catheter on cervical ripening.*

*A randomized clinical trial was carried out at Dhaka Medical College Hospital during the period from March 2002 to November 2002. Ninety patients, who were chosen for induction, were selected for this study, 45 patients were randomly selected for Foley's catheter group and 45 patients for misoprostol group by using lottery. The baseline characteristics like age, parity, socioeconomic condition, gestational age; Bishop's score and indication of induction of labor were almost same in both groups.*

*Mean duration of onset of labour was 13.60±5.0 and 15.26±3.58 hours, induction-full dilatation was 18.83±2.94*

*and 20.03±2.46 hours and induction-delivery interval was 20.04±2.82 and 21.18±2.32 hours in the misoprostol and Foley's catheter groups respectively. The differences were not significant. Mode of delivery and fetal outcome were also same in both group. Complications like vomiting and hyperstimulation appeared in few cases in misoprostol group but not significant.*

*From this study, it was found that the safety and efficacy of Foley's catheter is comparable to misoprostol. In addition, Foley's catheter is free from some side effects of misoprostol, like vomiting and hyperstimulation. Therefore, Foley's catheter can be used for cervical ripening.*

*Key words: Induction of labor, Foley's catheter, misoprostol.*

*(J Bangladesh Coll Phys Surg 2009; 27: 5-12)*

### Introduction:

Induction of labour is a standard obstetric approach by which pregnancy is terminated artificially any time after the age of viability. Induction of labour should be considered when further prolongation of pregnancy might expose the mother or fetus or both to certain risk and when vaginal delivery is not contraindicated. Common indications for labour are prolonged pregnancy, diabetes mellitus, Rh-isoinmunization, pre-eclampsia, chronic hypertension, placental insufficiency, intrauterine

growth retardation (IUGR), intrauterine death (IUD) and congenital malformation of fetus.<sup>1</sup>

The principal concern is how to provide the most effective, easy to use, safest and less expensive way to terminate the pregnancy. The success of induction depends on the consistency, compliance and configuration of the cervix. In approximately 10 percent of all pregnancies, women have unfavourable cervix; and when labour is induced in an unripe cervix, it is associated with higher than normal incidence of failure of induction, prolonged labour, instrumental delivery and Caesarean section.<sup>2</sup>

The unripe cervix is known to impede labour induction. So, careful evaluation of the cervix is predictive of the potential success of induction and is highly recommended before induction. Cervical ripening can be accomplished mechanically or medically using hormones and thus increase the success rate of induction of labour. These include: (a) oxytocin, (b) intravaginal, intracervical or extraamniotic application of prostaglandins, (c) intravaginal administration of oestradiol, (d) intracervical placement of osmotic dilators (e)

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stripping the membrane, and (f) amniotomy.<sup>3</sup>

Numerous studies have shown locally applied prostaglandins (PG), principally PGE<sub>2</sub> and PGE<sub>1</sub>, to increase cervical compliance and dilatation. Prostaglandin E-induced cervical ripening is associated with enzymatic collagen degradation and increased water content in the cervical extracellular matrix. Independent of their local effects on the cervix, PGs also stimulates the myometrium, resulting in uterine contractions. Misoprostol, a synthetic prostaglandin E<sub>1</sub> analogue, which was initially used in peptic ulcer treatment, is a promising agent in cervical ripening. Possible advantages of misoprostol may be the cost effectiveness, ease of administration, well tolerability and most notably, its dual action in cervical ripening and labour induction.<sup>4</sup>

Mechanical methods of cervical ripening act primarily by dilating and stretching the lower uterine segment and cervix. Several studies suggest that cervical ripening with an extraamniotic catheter balloon has advantages of simplicity, low cost, reversibility and lack of systemic or serious side-effect. Moreover, the ripening efficiency of the catheter balloon is better or similar to that with local misoprostol.<sup>5</sup>

This study was designed to find out the effectiveness and safety of Foley's catheter and misoprostol in cervical ripening and induction of labor.

#### **Material and Methods:**

This is a randomized clinical trial conducted in the Department of Obstetrics and Gynaecology, Dhaka Medical College Hospital (DMCH) from March to November, 2002. The methods and purpose of the study were explained to the patients and only those who agreed were finally selected. Written consent was taken from each respondent. The inclusion criteria were intact membrane, singleton pregnancies, cephalic presentation, low Bishop score ( $\leq 5$ ) and pregnancies after the age of viability. Patients with vaginal infection, placenta preavia, low-lying placenta, unexplained vaginal bleeding, presentation other than head and previous caesarean section were excluded from the study. A total 90 patients were randomly selected for this study. All patients came during the study period were included. All patients were divided into two groups by simple lottery

method. Group-I was the misoprostol group (n=45), where misoprostol vaginal tablet was used for cervical ripening. Group-II (n=45) was Foley's catheter group, where cervical ripening was done by using intracervical extraamniotic Foley's catheter.

A formal scoring of the cervix was done by Bishop's scoring system before induction.

In the first group misoprostol was introduced. The misoprostol dosing regimen was 50  $\mu$ g (one-fourth of a 200  $\mu$ g tablet prepared by the pharmacist in India) inserted intravaginally (in the posterior vaginal fornix), every 6 hour for a maximum of four doses, that is 200  $\mu$ g. Following insertion, close monitoring of fetal heart rate and observation was done to detect hyperstimulation. Cervical score was reassessed after 4 hours. Before administration of subsequent doses of misoprostol, the patient's contraction frequency was evaluated manually. If the patient was having 1-3 contractions/10 minutes, she was observed for evidence of progressive cervical dilatation (at least 1 cm per hour). If labour was progressing, then no more dose was given and labor was observed. But if cervix was not ripened after 6 hours, the dose was repeated 6 hourly to maximum of 4 doses. If contraction was not adequate labor was augmented by ARM or oxytocin or by both.

Partograph was maintained once the patient went into active labour. If cervical dilatation did not progress for 4 hours and more during the active phase of labour, intravenous oxytocin was used for augmentation.

In the second group an 18-sized Foley's catheter was introduced through the cervix using a sterile technique with the aid of a speculum and sponge-holding forceps. No cleansing of the cervix was performed. Every effort was made to avoid contact of the vagina or ectocervix with the Foley's catheter. The Foley's catheter was advanced into the endocervical canal. Once it has passed the internal os, 30 ml-distilled water is instilled into the balloon.

The catheter was placed on traction by taping the end of the catheter to inside of the patient's thigh on minimal traction. Prophylactic antibiotic, ampicillin was given to all patients. When the patient went into active labor (defined as regular contraction, 3/10 minutes), she was sent to the observation ward and

followed as the first group. If, despite expulsion of the catheter, the patient did not go into the established labour within 1 hour, ARM was performed and oxytocin drip was administered. The procedure was considered to have failed if catheter was in situ for 24 hours without onset of labour pain or cervical dilation.

### Results:

There was no significant difference in mean age, height, weight, socioeconomic status, parity, gravidity, gestational age and Bishop's score among misoprostol and Foley's catheter group (Table-I).

**Table-I**

*Characteristics of the study subjects*

Parameters	Misoprostol group (n=45)	Foley's catheter group (n=45)	P value <sup>a</sup>
Age (years) (Mean±SD)	25.33±5.09	25.27±4.93	0.950 <sup>NS</sup>
Height (cm) (Mean±SD)	147.50±5.65	148.40±6.25	0.932 <sup>NS</sup>
Weight (kg) (Mean±SD)	52.20±3.1	53.3.0±4.2	0.841 <sup>NS</sup>
Parity (Median)	1.0	1.0	
Gravidity (Median)	2.0	2.0	
Gestational age (weeks) (Mean±SD)	36.37±5.04	36.24±4.96	0.689 <sup>NS</sup>
Bishop's score (Mean±SD)	3.20±1.20	3.62±1.27	0.108 <sup>NS</sup>

<sup>a</sup>Unpaired Student's 't' test

<sup>NS</sup>Not significant

Indications of labour induction were postdated pregnancy in 19 (42.2%) and 17 (37.8%) cases, intrauterine death in 12 (26.7%) and 13 (28.9%) cases, eclampsia in 5 (11.1%) and 5 (11.1%) cases, preeclampsia in 6 (13.3%) and 5 (11.1%), and congenital malformation in 3 (6.7%) and 5 (11.1%) cases in misoprostol and Foley's catheter groups, respectively (Table-II). Statistical comparisons of the clinical parameters between groups were not significant.

**Table-II**

*Indication for labour induction*

Indications	Misoprostol group (n=45)		Foley's catheter group (n=45)		P value <sup>a</sup>
	No.	(%)	No.	(%)	
Postdated Pregnancy	19	(42.2)	17	(37.8)	1.000 <sup>NS</sup>
Intrauterine death (IUD)	12	(26.7)	13	(28.9)	1.000 <sup>NS</sup>
Eclampsia	5	(11.1)	5	(11.1)	1.000 <sup>NS</sup>
Preeclampsia	6	(13.3)	5	(11.1)	1.000 <sup>NS</sup>
Congenital malformation	3	(6.7)	5	(11.1)	1.000 <sup>NS</sup>

<sup>a</sup>Z-test

<sup>NS</sup>Not significant

After initiation of induction of labour, membrane ruptured spontaneously in 18 cases, 9 (20%) in each study group. But in the remaining 72 cases, either artificial rupture of membrane or oxytocin or both were required. Table-III shows the distribution of type of augmentations required in the two groups of patients. Oxytocin drip was required in 7 (15.6%) and 9 (20%), artificial rupture membrane (ARM) required in 27(60%) and 17 (37.8%), and both oxytocin drip and ARM required in 12 (26.7%) and 10 (22.2%) cases in misoprostol and Foley's catheter groups, respectively. Statistical analyses showed no significant differences between the groups.

**Table-III**

*Comparison of augmentation required in misoprostol and Foley's catheter groups*

Augmentations	Misoprostol group (n=45)		Foley's catheter group (n=45)		P value <sup>a</sup>
	No.	(%)	No.	(%)	
Oxytocin drip	7	(15.6)	9	(20.0)	0.581 <sup>NS</sup>
ARM	27	(37.8)	17	(37.8)	1.000 <sup>NS</sup>
ARM+ Oxytocin drip	12	(60%)	10	(22.2)	0.624 <sup>NS</sup>
None	9	(20.0)	9	(20.0)	1.000 <sup>NS</sup>

<sup>a</sup>Chi-square test

<sup>NS</sup>Not significant

Changes in cervical score developed after 6 hour and 12 hour in two study groups is shown in table IV. The

initial Cervical score in Misoprostol group was  $3.20 \pm 1.20$  and in Foley's catheter group was  $3.62 \pm 1.27$ . Cervical score after six hours was  $6.10 \pm 1.46$  and  $5.87 \pm 1.32$  and after 12 hours was  $8.35 \pm 1.34$  and  $7.79 \pm 1.68$  respectively in both groups. Statistical analyses showed no significant differences between the groups in terms of cervical score after 6 hours and 12 hours.

**Table-IV**

*Comparison of cervical ripening in relation to time between the two study groups*

Group	Initial cervical score	Cervical score after 6 hours	Cervical score after 12 hours
Misoprostol group (n=45)	$3.20 \pm 1.20$	$6.10 \pm 1.46$	$8.35 \pm 1.34$
Foley's catheter group (n=45)	$3.62 \pm 1.27$	$5.87 \pm 1.32$	$7.79 \pm 1.68$
P value	0.108 <sup>NS</sup>	0.817 <sup>NS</sup>	0.781 <sup>NS</sup>

Comparison of induction-labour pain interval, induction full-dilatation interval and induction-delivery interval between the two study groups are shown in table-V. Mean ( $\pm$ SD) duration of onset of labour was  $13.60 \pm 5.0$  and  $15.26 \pm 3.58$  hours, induction-full dilatation interval was  $18.83 \pm 2.94$  and  $20.03 \pm 2.46$  hours and induction-delivery interval was  $20.04 \pm 2.82$  and  $21.18 \pm 2.32$  hours in the misoprostol and Foley's catheter groups, respectively. Comparison of mean differences of these parameters between the groups showed no significant difference.

**Table-V**

*Comparison of intrapartum variables between the two study groups*

Parameters	Misoprostol (Mean $\pm$ SD)	Foley's catheter (Mean $\pm$ SD)	P value <sup>a</sup>
Induction-labour pain interval (hours)	$13.60 \pm 5.0$ (n=45)	$15.26 \pm 3.58$ (n=45)	0.074 <sup>NS</sup>
Induction-full dilatation interval (hours)	$18.83 \pm 2.94$ (n=36)	$20.03 \pm 2.46$ (n=37)	0.064 <sup>NS</sup>
Induction-delivery interval (hours)	$20.04 \pm 2.82$ (n=36)	$21.18 \pm 2.32$ (n=37)	0.064 <sup>NS</sup>

<sup>a</sup>Unpaired Student's 't' test

<sup>NS</sup>Not significant

Number of doses (one dose equals to one-fourth of a tablet) of misoprostol required for cervical ripening are 3 doses in sixteen (35.6%) cases, 2 doses in 13 (28.9%) cases, 4 doses in 10 (22.2%) cases and 1 dose in 6 (13.3%) cases .

Overall, 73 babies were delivered vaginally without any remarkable complication, but 17 mothers required Caesarean section delivery. Group wise, 36 (80%) women in misoprostol group and 37 (82.2%) women in Foley's catheter group were delivered vaginally. The differences were not statistically significant (Table-VI). However, Caesarean deliveries were 9 (20%) and 8 (17.8%) in misoprostol and Foley's catheter groups, respectively, which is also not significant.

**Table-VI**

*Comparison of mode of delivery between the two groups*

Mode of delivery	Misoprostol group (n=45)		Foley's catheter group (n=45)		P value <sup>a</sup>
	No.	(%)	No.	(%)	
Vaginal	36	(80.0)	37	(82.2)	0.788 <sup>NS</sup>
Caesarean	9	(20.0)	8	(17.8)	0.788 <sup>NS</sup>

<sup>a</sup>Chi-square test

<sup>NS</sup>Not significant

Caesarean section was higher in misoprostol group because of uterine hyperstimulation in 3 cases (33.3%). Eclampsia with recurrent convulsion was present in 2 (22.2%) cases in both the groups. Fetal distress was present in 4 (44.4%) cases of misoprostol and 6 (75%) cases of Foley's catheter group (Table-VII). Regarding indications of Caesarean section, no statistically significant difference was observed between the groups.

**Table-VII**

*Indications for Caesarean section*

Indications	Misoprostol group (n=9)		Foley's catheter group (n=8)		P value <sup>a</sup>
	No.	(%)	No.	(%)	
Fetal distress	4	(44.4)	6	(75.0)	0.201 <sup>NS</sup>
Hyper stimulation	3	(33.3)	0		0.072 <sup>NS</sup>
Eclampsia with recurrent convulsion	2	(22.2)	2	(25.0)	0.893 <sup>NS</sup>

<sup>a</sup>Chi-square test

<sup>NS</sup>Not significant

Table-VIII shows the relationship between Bishop's score and induction to full dilatation interval of the two study groups. Both the groups (misoprostol and Foley's catheter) showed a negative ( $r = 0.836$  and  $0.763$ , respectively) and highly significant ( $P < 0.001$  in both groups) relationship, that is, increase in Bishop's score, reduce the induction-full dilatation interval.

**Table-VIII**

*Relationship of Bishop's score with induction-full dilatation interval*

Bishop's Score	Induction-full dilatation interval (hours)	
	Misoprostol group (Mean±SD)	Foley's catheter group (Mean±SD)
1	25.57±0.50	26.00±1.41
2	20.75±0.96	22.40±1.52
3	18.00±1.34	20.14±1.07
4	18.00±0.94	20.14±1.07
5	16.29±1.11	18.21±1.67
r value	-0.836	-0.763
P value	0.000***	0.000***

Correlation-coefficient (r) test

\*\*\*Significant at  $P < 0.001$

Nausea/vomiting were present in 4 (8.9%) cases of misoprostol group and none in the Foley's catheter.

Distribution of babies according their 1-minute and 5-minute Apgar scores has been shown in table IX. In misoprostol group, 2 (6.1%) newborn had severe asphyxia at 1-minute Apgar score but improved at 5-minute. Similarly, 8 (24.2%) babies in misoprostol group and 11 (34.4%) babies in Foley's catheter group had moderate asphyxia at 1-minute Apgar score, but almost all of them (except 2 babies of misoprostol group) improved at 5-minute. Statistical differences were not significant.

The mean ( $\pm$ SD) cost was Taka 118.62±89 and 160.20±52.52, respectively, in misoprostol and Foley's catheter groups (Table-X). Statistically, the difference is significant ( $P < 0.01$ ).

**Table-IX**

*Distribution and comparison of Apgar score (1-minute and 5-minute) of the babies of the two study groups.*

Indications	Misoprostol group (n=33)		Foley's catheter group (n=32)	
	No.	(%)	No.	(%)
1-minute				
$\leq 3$	2	(6.1)	0	
4-6	8	(24.2)	11	(34.4)
$\geq 7$	23	(69.7)	21	(65.6)
$X^2 = 2.5.50$ , $df = 2$ , $P = 0.279$ (not significant)				
5-minute				
$\leq 3$	0		0	
4-6	2	(6.1)	0	
$\geq 7$	31	(93.9)	32	(100.0)
$X^2 = 2.001$ , $df = 1$ , $P = 0.157^{NS}$				

<sup>NS</sup>Not significant

**Table-X**

*Cost involvement in the two groups of study subjects*

Groups	Cost (Taka) (Mean±SD)	P value <sup>a</sup>
Misoprostol (n=45)	118.62±68.89	0.002**
Foley's catheter (n=45)	160.20±52.52	

<sup>a</sup>Unpaired Student's 't' test

\*\* Significant at  $P < 0.01$

### Discussion:

The need to ripe the cervix prior to induction of labour has become a reality in our lives as obstetricians. Analysis of the United States birth statistics (National Center for Health Statistics) shows that approximately 10 percent of all inductions require cervical ripening. With improving maternal and perinatal care in Bangladesh, more pregnant women will be identified with one or other indications for induction and be referred to the hospitals. The purpose of this study was to highlight a simple method for ripening of cervix that may be suitable for an obstetrical unit.

In this study, 90 patients were selected by simple randomization, 45 in each group (misoprostol and Foley's catheter). Demographic, socioeconomic and obstetric characteristics were compared between the two study groups. None of these characteristics showed any significant difference between these two groups.

Prostaglandins are currently the most commonly used agents for the ripening of unfavorable cervix and for induction of labor. These pharmacologic agents are, however, unstable and may have less potency if they are not stored properly and their effects are not readily reversible. However, misoprostol tablets do not require any special temperature to store, and they are available in strips like other normal tablets. Prostaglandins have some disadvantages, such as variable absorption, unpredictable systemic side effect etc. No pharmacologic methods of cervical ripening and induction of labour possess the advantages of lack of systemic side-effects and easy reversibility.

Foley's catheter has been used to ripen the cervix prior to surgical induction of labour.<sup>6</sup> When women with low Bishop's score and unripe cervix are subjected to induction by Foley's catheter, it helped in ripening of the cervix. Inflated Foley's catheter when placed extra amniotically has been found to improve the inducibility of cervix.<sup>7,8</sup> The main argument against the use of this method could be the risk of introduction of infection because many potential pathogens inhabit vagina and endo-cervix. But the risk was not quantitatively assessed. These risks can be eliminated by aseptic precautions, and use of aseptic techniques during the insertion of catheters, and the use of sterile water for inflating the balloon. In the present series, it was not possible to ensure that there was no obvious vaginal infection in all of these patients as there were limited facilities available for culture and sensitivity tests for high vaginal and endo cervical swabs. Sandhu et al. in their study reported that the rate of infection with Foley's catheter method is not significant and is comparable to the incidence of hospital acquired infection as stated by different authors with different procedures.<sup>8</sup>

The results from this small study show that an inflated Foley's catheter placed in the extra amniotic space was as efficient as intra-vaginal misoprostol

tablet, in ripening the unfavorable cervix. The success of induction of labour was apparently similar in both the groups. The number of caesarean section was 9 (20%) in misoprostol group, whereas it was 8 (17.8%) in Foley's catheter group. Though there was higher Caesarean section in misoprostol group, but statistically there was no significant difference. The Caesarean section was apparently higher in misoprostol group because of uterine hyper stimulation (presence of hypertonus uterine contraction associated with abnormal FHR). These patients were treated immediately with oxygen therapy, left lateral positioning followed by emergency caesarean section. Two of the three newborns had severe asphyxia and had poor Apgar score at 1-minute, but they improved substantially and 5-minute Apgar score became 10 after neonatal resuscitation.

The use of Foley's catheter was as acceptable to the patients as the misoprostol intravaginal tablet. None of the babies or the mothers had any adverse reaction. None of the patients developed any complication during the period of observation. None of the selected patients had accidental rupture of membrane, antepartum or postpartum pyrexia attributable to the use of Foley's catheter. On the other hand four patients of the misoprostol group developed vomiting. Vomiting was not so severe and simply managed by reassurance to the patient.

The mean ( $\pm$ SD) cervical score in misoprostol and Foley's catheter group were  $3.20 \pm 1.2$  and  $3.62 \pm 1.27$ , respectively; and the difference is not statistically significant. Foley's catheter is as effective as vaginal misoprostol in enhancement of inducibility, with similar induction to onset of labour pain interval, induction to full dilatation interval and induction to delivery interval. Outcomes of labour in these two groups are also similar. There was no stillbirth or neonatal death in either group.

Embery and Moleison describe the use of Foley's catheter to effect cervical effacement and dilatation.<sup>6</sup> They concluded that this method was effective in bringing about the initial effacement and dilatation of the cervix for successful induction.

This study shows that there is a negative correlation between Bishop's score and time of full dilatation of

cervix, which is similar in both the groups. The findings of this study indicate that pre-induction Bishop's scoring should not be an indicator for selection of method for induction.

We did not find any complain of discomfort on the use of Foley's catheter and it was equally acceptable as misoprostol by the study patients.

Moreover, in misoprostol group, three patients developed hyperstimulation and emergency caesarean section were done in these patients. There was no such side-effect in Foley's catheter group.

In a randomized comparison of oral misoprostol versus Foley's catheter and oxytocin for induction of labour at term, it was found by Abramovici et al. that in multiparous patients the percentage of delivery of neonates within 24 hours and the median induction to delivery time were similar in the two groups.<sup>9</sup> In nulliparous patients, however, delivery within 24 hours was significantly less likely in the misoprostol group and the median induction to delivery time was longer.

A randomized trial of misoprostol and extraamniotic saline infusion for cervical ripening and labour induction by Shyla et al. showed that both methods of labour induction appeared to be equally effective.<sup>10</sup>

Several studies have shown superiority of the Foley balloon catheter over other techniques, resulting in improved cervical Bishop score, increased rate of labour induction and a higher number of vaginal deliveries.<sup>11,12</sup>

Barkai et al. found no side-effects from the Foley catheter method for either the mother or the baby.<sup>13</sup>

A comparative study of induction of labour by Foley's catheter with that by sweeping of the membrane in prolonged pregnancy by Dewan et al.<sup>14</sup> showed that induction of labour by Foley's catheter is an effective method of induction of labour, especially in postdated pregnancies with very unripe cervix. It has been found to result in a safe vaginal delivery with short induction delivery interval when compared with induction by sweeping of the membranes.

A clinical study of induction of labour by Foley's catheter was done by Begum et al.<sup>15</sup> in Sir Salimullah Medical College and Mitford Hospital and found the time interval between insertion of catheter and

delivery was in most cases between 24 and 48 hours in the prolonged pregnancy and hypertensive disorder group and more than 48 hours in the IUD group.

In the present study patients median gestational age was 36 weeks in both misoprostol and Foley's catheter groups.

It was also found that low Apgar scores in both the groups, because most of the patients had antepartum eclampsia as well as low gestational age. But all of these distributions are similar in both the groups and so did not affect the results.

The total cost of the procedure was less in misoprostol group (mean Taka 118.62) in comparison to Foley's catheter group (mean Taka 160.20). Statistically the difference is significant ( $P < 0.01$ ). Although cost involvement was less in misoprostol group, it was not available in our country during the study period. On the other hand, Foley's catheter is easily available everywhere of the country. Moreover, the cost to the Foley's catheter group is not beyond the capacity of the general population. In addition, results of both the groups, in terms of cervical ripening, induction delivery interval, mode of delivery and fetal outcome is similar.

Considering requirement for proper monitoring of mother and fetus, irreversible effect on uterine contraction, which may lead to rupture uterus by misoprostol, lack of adequate facilities of monitoring at peripheral hospitals in Bangladesh, it is beneficial to use Foley's catheter than misoprostol.

#### **Conclusion:**

Though prostaglandins are currently most commonly accepted and widely used agents for the ripening of unfavourable cervix and for induction of labour in the developed countries, but they are associated with some problems, such as absorption, unpredictable patient response, vomiting, diarrhoea, tachycardia, bronchospasm, and some times unavoidable irreversible hypertonic uterine contraction. An alternative approach for cervical ripening has been sought. This alternative approach should be safe, available, preserved at normal temperature, as effective as prostaglandins, cost-effective, less side-effects and acceptable to the patients as well as to the physicians. Foley's catheter for cervical ripening has

been found as an alternative method to prostaglandins, as it has almost all the expected criteria. To arrive at a definite conclusion, it is suggested that a long-term study with larger number of subjects need to be carried out to make a plan of action in the selection of method of induction of labour for Bangladeshi women.

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# Management Strategies of Major Hepatobiliary Cysts - A Retrospective Study of 145 Consecutive Patients

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## Summary:

*Hepatobiliary cysts consist of a heterogeneous group of diseases that differ in cause, prevalence and manifestations. Some are found incidentally on imaging studies and tend to have a benign course. Symptomatic cysts and those become endanger to life need adequate treatment. We are reporting clinical and pathological features of 145 patients with different types of Hepatobiliary cysts along with their therapeutic approaches and outcomes. Study period was September 1997 to July 2006 (107 months). The most common was simple cyst followed by hydatid and choledochal cysts. Fifty-four (37.25%) cysts were asymptomatic and diagnosed incidentally, 75 (51.72%) had some form of symptoms; like abdominal pain, discomfort and swelling. Complications like obstructive jaundice; portal hypertension, vena caval obstruction, bronchobiliary fistula and peritonitis are noted in remaining 16 (11.03%)*

*symptomatic patients. They were treated by partial pericystectomy with omentoplasty (44.83%), excision of the cyst with Roux-en-Y Hepaticojejunostomy or Cholangiojejunostomy (16.55%), partial pericystectomy with closure of the biliary leakage and omentoplasty (13.8%), closed total cystectomy (5.52%), right or left typical or atypical hepatectomy (14.49%), segmental deroofting and fenestration (4.8%). There were no operative deaths or major postoperative complications. The recurrence was documented in 7 patients (4.83%) in the follow up period. Three patients with hepatobiliary cystadenocarcinoma died during follow-up.*

*In summary, Clinico-pathological features, therapeutic approaches and outcome of 145 Hepatobiliary cysts after surgery has been discussed in the light of published literatures.*

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## Introduction:

Hepatobiliary cysts are well known since ancient time. Brodie first described these cysts as hepatic cysts in 1846<sup>1</sup>. This "liver water" or cysts creates diagnostic and therapeutic dilemma in different situations. About 4% of the total populations have some form of liver cyst during their lifetime. Most of them are asymptomatic; do not require any surgical intervention. But those are symptomatic and become endanger to life require surgical treatment. Small simple cysts are asymptomatic but the larger one produces symptom. They destroy liver parenchyma; obstruct hepatic vein, portal vein, bile duct and inferior vena cava. Rupture of the cyst causes considerable morbidity and mortality. Management of these cysts is inevitable for treatment of the ailments and preventing further damage of the hepatic parenchyma or life threatening complications. Choledochal cysts are associated with pancreatobiliary maljunction (PBM) and have a high risk of malignancy<sup>2</sup>. Total excision of the cyst is therefore mandatory for curative intent<sup>3,4</sup>. Diagnosis of neoplastic cysts like hepatobiliary cyst adenoma and cystadenocarcinoma still remains in a dilemma. Proper diagnosis and adequate surgical intervention is mandatory<sup>5-9</sup>.

### Materials and Methods:

We have treated 145 patients with Hepatobiliary cysts at the BIRDEM and other Hospitals of Dhaka between September 1997 and July 2006 (107 months). There were 5 children & 140 adults and their mean age was 48.8 (range 1.5 – 80) years. The size of cysts was 4 to 35 cm (average: 19.5 cm). The number of cysts was 1 to 4 in each patient. Data were extracted retrospectively from patient's hospital records for demographics, clinical presentations, types of surgical intervention, histological findings and outcomes.

A simple cyst was defined sonographically as a hypoechoic fluid-filled space occupying lesion with well demarcated wall. Hydatid cyst was diagnosed on the ultrasonography (US) and Computerized Tomography (CT) appearance of multilocular cystic lesion with daughter cysts, split wall, detached membrane, septations, and calcification of cyst wall. Indirect haemagglutination assay (IHA) was done for echinococcus infestations. Choledochal cyst was suspected by the US findings as cystic appearance of intrahepatic or extrahepatic biliary system. Endoscopic Retrograde Cholangio Pancreatography (ERCP), Magnetic resonance cholangiogram (MRC) and CT scan were done for evaluation of the patients with choledochal cysts. Vertical reconstruction of CT scan is very helpful in evaluating hepato-biliary cysts.

Diagnosis of Hepatobiliary cystadenoma and cystadenocarcinoma were made by CT scan appearance of irregular thick wall, septations, calcification of septa and papillary projections. Nodular and irregular cyst margin with mucinous or hemorrhagic contents were the strong suspicion of neoplastic cysts.

Polycystic liver disease (PLD) was diagnosed by multiple cystic lesions in both lobes of liver, usually associated with cystic lesion in other organ commonly, as in kidneys. Histological confirmation and clinical correlation was made in all the cysts after surgery.

### Statistical analysis

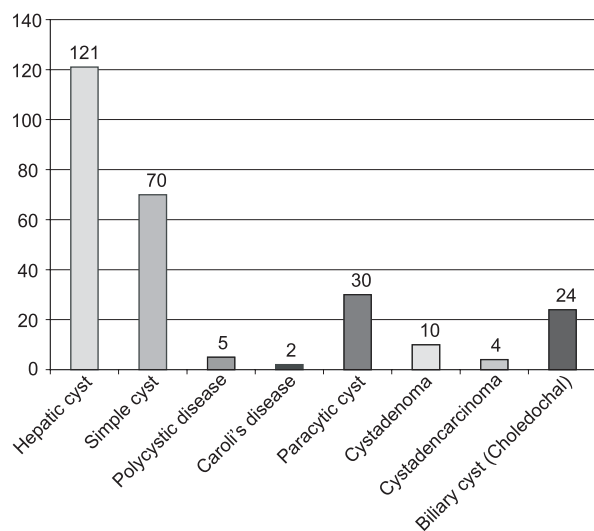
The chi-square test was used to assess significant between proportions. A value of  $p < 0.05$  was considered statistically significant.

### Results:

In the present series, of 145 Hepatobiliary cysts, 121 were hepatic cysts and 24 were biliary cyst (choledochal cyst). The numbers of non-parasitic cysts were 77 (53.1%), of which simple cysts 70 (48.27%), polycystic liver disease 5 (3.45%) and caroli's disease 2 (3.8%). There were 30 parasitic cysts and 14 neoplastic cysts (Table-I). Fifty-four (37.25%) cysts were asymptomatic and diagnosed incidentally. They were submitted to operation for increasing size of the cyst, suspicion of malignancy or patients' desire to remove the cyst. Seventy-five patients (51.72%) presented with some form of symptoms, 14 with abdominal pain, 45 with hepatomegaly, 16 with infections and other with non-specific symptoms. Sixteen patients (11.03%) presented with complications; 3 extra hepatic bile duct compression, 2 intrahepatic bile duct compression, 2 portal vein compression (combined portal vein & bile duct in one), and 1 vena cava compression, 2 rupture of the cyst, 3 disseminated hydatid cyst and 1 bronchobiliary fistula (Table-II). Thirty six (24.82%) patients had recurrent cyst, they underwent previous surgical intervention in other institutions. Among the recurrent cysts, 12 were simple cysts, 15 hydatid cysts, 3 cystadenoma, 2 cystadenocarcinoma and 4 choledochal cysts. Eleven simple cysts recurred after previous ultrasound guided percutaneous drainage and one following Roux-en-Y cystojejunostomy due to blockage of cysto-jejunal anastomotic loop by the cirrhotic changes in adjacent portion of the liver.

**Table-I**

<i>Types of hepatobiliary cysts (n=145)</i>		
Types of cysts	n	%
Hepatic cyst	121	83.45
a. Nonparasitic cyst	77	53.1
• Simple cyst	70	
• Polycystic disease	5	
• Caroli's disease	2	
b. Parasitic cyst (Hydatid)	30	20.69
c. Neoplastic cyst	14	9.6
• Cystadenoma	10	
• Cystadencarcinoma	4	
Biliary cyst (Choledochal)	24	16.55
Total	145	100



**Fig. 1:** Types of hepatobiliary cysts (n= 145)

**Table-II**

*Presentation of patients with Hepatic cysts (n=145)*

Parameters	n	(%)
Asymptomatic	54	(37.25)
Symptomatic	75	(51.72)
● Abdominal pain	14	
● Hepatomegaly	45	
● Infections & vague symptoms	16	
Complications	16	(11.03)
● Extrahepatic biliary tract compression	3	
● Intrahepatic biliary tract compression	2	
● Portal compression	2	
● Vena caval compression	1	
● Rupture of the cyst	2	
● Disseminated hydatid cyst	3	
● Peritonitis	2	
● Bronchobiliary fistula	1	

There was diagnostic dilemma in 12 patients (8.27%). The extrahepatic cystic lesions like suprarenal cyst, retroperitoneal cysts, and pancreatic cyst were wrongly labeled as liver cysts by imaging. Laparotomy revealed no hepatic cystic lesions in those patients. Intrahepatic lesions like hemangioma,

liver abscess, cystic degeneration of liver tumours were noted in 4 patients. All the extrahepatic cystic lesions and noncystic intrahepatic lesions were treated accordingly and were excluded from the study.

Cystectomy with omentoplasty done in 93 (64.13%) cases of hepatic cysts, 21 cases were treated by hepatectomy and 7 by segmental de-roofing and fenestration. Twenty-four choledochal cysts (16.55%) were treated by excision of the cyst with Roux-en-Y hepaticojejunostomy (Table-III).

**Table-III**

*Surgical treatment of hepatobiliary cysts (n=145)*

Types of surgery	n	(%)
Cystectomy with omentoplasty	93	(64.13)
Hepatectomy	21	(14.48)
Segmental deroofting / fenestration	07	(4.83)
Total cystectomy with roux-en-Y hepatico-/cholangio-jejunostomy	24	(16.55)
Total	145	(100%)

Analysis of clinico-pathological data of different hepatic cysts revealed that the incidence of non-parasitic cyst was significantly higher than parasitic and neoplastic cysts ( $p < 0.01$ ). The ages of patients with neoplastic cyst were significantly higher than the age of patients with non-parasitic and parasitic cysts ( $p < 0.01$ ). Neoplastic cysts were presented with symptoms more frequently ( $p < 0.01$ ) than parasitic and nonparasitic cysts. Most of the non-parasitic cysts and all parasitic cysts were treated by cystectomy where as the all neoplastic cysts needed hepatectomy (Table-IV).

There were no operative deaths or major postoperative complications. Follow-up was given in 90 patients (62.06%). Wound infections were found in 10 patients. The recurrence was documented in 7 patients (4.83%), 6 with hydatid cyst and one with cystadenoma. Three patients with hepatobiliary cystadenocarcinoma died, one with cardiac disease, and the other with metastasis during follow-up (Table -V).

**Table-IV***Comparison of clinicopathological data among different types of hepatic cysts (n = 121)*

Parameters	Non-parasitic cyst		Parasitic cyst		Neoplastic cyst	
	n	(%)	n	(%)	n	(%)
Incidence of cyst	77	(63.63)*	30	(24.79)	14	(11.57)
Mean age (range) years	46.2	(34 – 64)	34.6	(1.5 – 55)	71.3	(68 – 80)**
Symptoms	21	(27.27)	08	(26.66)	10	(71.42)**
Procedures						
● Cystectomy	70	(90.90)	30	(100)	0	
● Hepatectomy	07	(9.09)	0		14	(100)**

\* p&lt;0.01, non-parasitic vs parasitic &amp; neoplastic

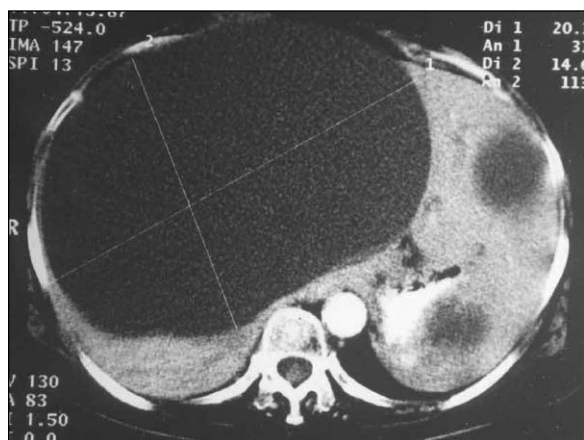
\*\* p&lt;0.01, neoplastic vs non-parasitic&amp; parasitic

**Table-V***Outcome of patients with hepatic cysts (n = 145)*

Parameters	n	%
Morbidity	29	20
● Wound infections	10	6.9
● Incisional hernia	4	2.76
● Persistent discharge from wound	8	5.52
● Subhepatic abscess	3	2.76
Mortality		
● Operative	0	-
● Hospital	0	
Recurrence rate*	7	4.83
Patient follow up	90	62.06
Follow up period (months)	112	-
Death during follow up**	3	2.06

\* Cystadenoma (n = 01), hydatid cyst (n = 06)

\*\* Hepatic cystadenocarcinoma with heart disease



(a) CT sca



(b) Peroperative view

**Fig.2:** Simple hepatic cyst (right lobe)



a. Multiple simple cysts



b. Hour glass configuration of simple cyst



c. Cyst of the caudate lobe of liver.



d. Polycystic liver disease

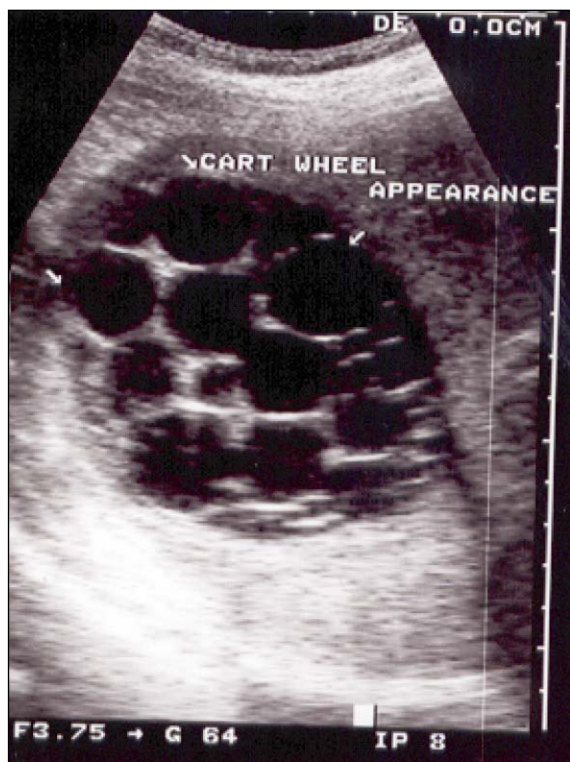


e. Cystadenoma



f. Cystadenocarcinoma

**Fig.3:** Different types of hepatic cysts (white arrow).



**Fig.4:** Hydatid Cyst of Liver. a. 'Honey comb' appearance at USG

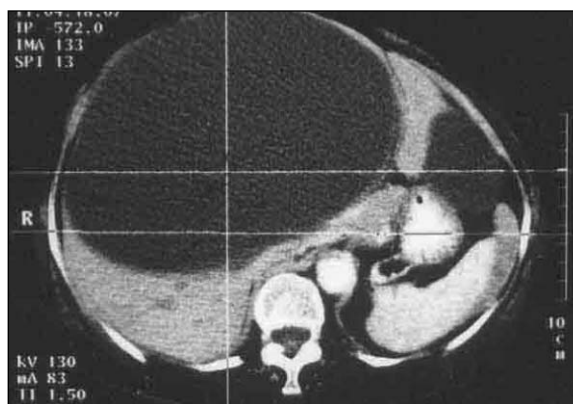
#### Discussion:

The present series included almost all types of common cysts of the hepatobiliary system. Most of the cysts were larger in size and complicated due to their mechanical and infective elements. The higher proportions of these symptomatic cases were due to the referral to specialized Hepatobiliary Pancreatic surgery services. All the patients evaluated initially by ultrasonography. CT scan done for 90% of the patients to understand the nature and extent of the cyst.<sup>10,11,12</sup> Indirect hemagglutination (IHA) test was performed in 80% of patients with hydatid cysts. However, hydatid cyst was confirmed in 8 patients with negative IHA test. This finding is consistent with the report of Kagon et al<sup>13</sup>. Hydatid cyst filled with an amorphous mass may simulates the neoplastic lesions of the liver in imaging, which creates diagnostic problem<sup>14</sup>.

We strictly followed the principle of operative management of liver hydatid cyst<sup>15</sup>. Adequate exposure, safe external decompression of the cyst,



a. Compressing the biliary tract.



b. Compressing the vena cava

#### *Fig.5: Complications of simple hepatic cyst*

and prevention of peroperative spillage of cyst contents are mandatory. Hypertonic Sodium Chloride solution (3% NaCl) was used as scolicedal agent. Cystobiliary communications were closed with suture. Roux-en-Y cholangiojejunostomy was performed in 2 patients to preserve the functioning hepatic parenchyma. Minor postoperative bile leak was noted in 8 patients, which were closed spontaneously in about 3 weeks time. All the hydatid cyst patients received albendazole (400mg b.i.d. or 10mg/kg/day) for 2 weeks preoperatively and 4 weeks postoperatively<sup>16</sup>. Five patients having multiple hydatid cysts with severe fibrosis were treated by atypical resection of hepatic lobe. Patients with disseminated hydatid needed wide excision of the omentum and other structures including resection and anastomosis of small and large bowel.<sup>17,18</sup> Hydatid cyst with Broncho biliary fistula needed hepatic resection and thoracotomy for the closure of the fistula<sup>19</sup>. In one patient hydatid cyst ruptured into the biliary tree and developed obstructive jaundice.

He was treated by choledochotomy, removal of hydatid materials & partial excision of the cyst. Omentoplasty was done in all patients with partial cystectomy. Fifteen patients with recurrent hydatid cyst who had previous surgery in other centers were treated by partial excision or atypical liver resection. Recently, a new technique called Puncture Aspiration Installation of Scolicidal and Reaspiration (PAIR) is being practiced for percutaneous drainage of hepatic hydatid cyst.<sup>20-25</sup> This procedure sometime produces complications like bleeding, peritonitis, anaphylaxis, allergic reactions and biliary complications<sup>26</sup>. Inadvertent installation of sclerosing agent into a cyst with biliary communication can cause sclerosing cholangitis.<sup>27,28</sup> PAIR procedure could not be applied in our patients because of advanced state of the cyst and possibility of such complications.

Symptomatic simple cyst is usually treated by various surgical procedures.<sup>29-32</sup> Large cyst in the central region causes compression of the portal vein and bile duct causing portal hypertension and obstructive jaundice noticed in one patient.<sup>33</sup> Another patient presented with leg oedema because of the compression of inferior vena cava by a large simple cyst in most part of right lobe. A 19-months old girl had a large cyst in her liver with three cavities in it. One cavity contained clear fluid; second one was bile stained and the last one with purulent materials. These complicated cysts treated successfully by partial pericystectomy with omentoplasty<sup>34-36</sup>.

Most of the patients of choledochal cyst were associated with anomalous pancreatobiliary junction<sup>37</sup>. These cysts have high malignant potential.<sup>38</sup> Complete excision of the cyst from the pancreatobiliary junction up to the level of proximal duct with healthy biliary mucosa is the standard method. This procedure was performed in 18 patients. Six patients of choledochal cyst had severe fibrous adhesion with portal vein and hepatic artery. Mucosal resection was performed up to the proximal healthy mucosa in those 6 patients.<sup>34,38-41</sup> Biliary reconstruction was performed by Roux-en-Y hepaticojejunostomy in all patients. Histopathology examination of all the choledochal cysts was done to exclude malignancy.

Sequential fenestration and excision is commonly performed in patients with polycystic liver disease. It

relieves compression and the intervening hepatic parenchyma.<sup>42</sup> Five patients of the present series had polycystic disease and they were treated by sequential fenestration and excision of the cysts.

Caroli's diseases with multiple intrahepatic cystic lesions were noted in two patients. Hepatic resection with or without cholangiojejunostomy is the effective treatment for Caroli's disease when the cysts are located in an anatomical lobe.<sup>43-46</sup> In both of our patients with Caroli's disease, cysts were confined in the left lobe. Left hepatectomy was performed in one patient, and left hepatectomy with Roux-en-Y Cholangiojejunostomy in another.

The preferred treatment of cystadenoma is complete resection whenever possible, because of potential malignant transformation of the cyst. Partial excision of cyst adenoma and cystadenocarcinoma is invariably associated with recurrence and with poor prognosis<sup>47</sup>. Of the 14-neoplastic cysts, all were treated by typical hepatectomy. During follow up recurrence of cystadenoma in one case was recorded.

Recurrent liver cyst following previous ultrasonic guided percutaneous drainage was noted in 36 patients of the present series. They were successfully treated by excision of cyst. These findings discourage the percutaneous drainage procedure in treating liver cyst<sup>29</sup>.

Recently it has been reported that laparoscopic management of liver cyst could be done safely<sup>48, 49</sup>. But the scope of laparoscopic approach is limited in large & complicated cysts.

There was no immediate or 30-day postoperative mortality; however, morbidity occurred in 29 patients (20%). Maximum follow up was 112 months (up to December 2006). Ninety patients (62.07%) were available for follow-up. Seven patients had recurrence of cysts and 3 patients died during follow-up – One due to recurrence of the cystadenocarcinoma and the other two of co morbid cardiac diseases.

This present study of 145 patients of hepatobiliary cysts includes most of the kinds of cysts in the liver and the biliary tree reported in the literatures.

**Conclusion:**

The cystic lesions in the liver and biliary system is a common disorder. It may closely simulate the features of other hepatic or extra hepatic lesions. Histopathological examinations for all cystic lesions are mandatory, otherwise premalignant and malignant lesions may be missed. The symptomatic hepatic cysts demand a wide spectrum of hepatobiliary surgical strategies. It ranges from simple procedures to liver resections, biliary reconstructions and even liver transplantations for the end stage liver disease due to big cysts in certain circumstances. Adequate surgical intervention can offer cure in most of the patients.

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# Coronary Artery Bypass Grafting (CABG) Without General Anaesthesia- An Initial Experience in NICVD, Dhaka, Bangladesh

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## Summary:

**Objective:** our initial experience with 15 patients operated on without general anesthesia is reviewed to explore the validity of our surgical strategy. **Material and Methods:** 15 males between 45-65 years underwent off-pump coronary artery bypass grafting (OPCAB) with high thoracic epidural anesthesia (HTEA) between April to September 2006. Target vessels involved were the single vessel in 5, double vessel in 7 and triple vessel disease in 3 patients. CABG was performed through a median sternotomy in 13 patients and through limited access in 2 patients. **Results:** Among 15 patients, patients remain awake or were lightly sedated breathing spontaneously in 9 cases. In 3 patients pneumothorax was observed during surgical intervention. Average length of ICU stay was 1 day (range 1 to 2 days). In all cases, patients showed lack of treatable cardiac dysrhythmias and stable haemodynamic response to surgical procedures including cardiac positioning and direct handling.

## Introduction:

General anaesthesia is the usual practice in cardiac surgery. But high thoracic epidural anaesthesia (HTEA) is also an important tool in off pump coronary artery bypass (OPCAB) surgery. HTEA

**Conclusion:** CABG under epidural anesthesia appeared to be safe for and satisfying to the patients. Stable haemodynamics, low incidence of cardiac dysrhythmias and early recovery and discharge from ICU and low cost involvement are among the benefits that can be derived from this technique at least in selected patients. High thoracic epidural anaesthesia was proved to be very efficient in achieving, somatosensory & motor block in the chest, which in turn facilitates CABG without endotracheal general anaesthesia in selected patients. CABG in an awake patient without endotracheal general anaesthesia was first performed in October 1998 with high thoracic epidural block. Since then, similar cases had been reported in the literature to decrease the invasiveness of the CABG procedure. This report presents our initial experience in 15 patients which was performed during a time period of 6 months.

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yielding cardiac sympathectomy resulting in vasodilation of coronary is interal thoracic artery and bradycardia without haemodynamic compromise. Thoracic epidural anaesthesia may also decrease the incidence of supraventricular and ventricular arrhythmia undergoing cardio thoracic surgery. It also attenuates the stress response, a favorable oxygen demand supply ratio for the myocardium, balancing the pro coagulant activity after off pump surgery and effective control of pain. So epidural anaesthesia also shortens ICU stay and contributes to patients' satisfaction significantly after CABG. The goal of this study was to express our initial experience with coronary artery bypass grafting (CABG) without general anaesthesia and to facilitate the learning process towards performing cardiac surgery in a less invasive manner.

## Materials and Methods:

Between April to September 2006, 15 patients underwent off pump CABG with high thoracic epidural anesthesia. Patient selection criteria included the absence of recent antithrombotic (<1 week) or fibrinolytic therapy (<2 days), and patient co-operation. Severe left ventricular dysfunction, severe pulmonary disease, or any other variable that could present

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potential comorbidity did not affect patient selection. Written informed consent was obtained from every patient. All of them were male patients ranging in age from 35 to 65 years. No patients had contraindications for general anaesthesia. In all cases this procedure was used electively. A 0.07 mg/kg dose of Midazolam was used for premedication. At least 60 minutes elapsed between epidural catheter insertion and heparinization.

High thoracic epidural anaesthesia was used for these operations. The objective of this approach was to achieve somatosensory and motor block at the T<sub>1-8</sub> level, and motor block of the intercostal muscles while preserving diaphragmatic respiration. The upper permissible level of block was C<sub>6</sub> which was monitored by the development of Horner syndrome. The patient was placed in a lateral position and a 16 gauge flexible tip catheter (B.Braun) was inserted through a tuohy needle at the T<sub>1-2</sub> or T<sub>2-3</sub> inter space by using the median approach and the loss of resistance or hanging drop technique. The catheter was directed cephalad and advanced 3 to 4 cm into the epidural space. The block level was tested after epidural administration of a test dose of 5 ml of lignocaine (2%). An epidural anaesthesia solution was used for epidural anaesthesia, consisting of bupivacaine (0.5%, 20 ml), lignocaine (2%, 20 ml), Fentanyl 50 mgm (1 ml), and normal saline 9 ml. In the operating room 10 ml of epidural anaesthesia solution was administered epidurally as a bolus, and the level of the block was tested by assessing both temperature and pinprick discrimination.

Additional doses of epidural anaesthetic solution were administered as a bolus or by continuous infusion as needed to achieve motor block of the intercostal muscles. Motor block of the intercostal muscles was assessed visually by monitoring the loss of intercostal movement. Sensory block level was maintained at the C6-T8 level. Throughout operation, patients spontaneously breathed room air or nasal oxygen.

Target vessels involved were the LAD in 5 patients and LAD plus circumflex in 7 and LAD plus circumflex plus RCA in 3 patients. CABG was performed through minimal access in 2 patients (MIDCAB) and rest by median sternotomy.

In all operations 5000 IU of heparin was used for anticoagulation, which was reversed with protamine at the termination of operation. Cardiopulmonary bypass was used in 1 patient. Femoral block were given (by 2% lignocaine (10 ml) for taking venous graft. For sedation propofol was used intermittently.

### Results:

In all patients objectives of epidural anaesthesia were achieved. All patients' hemodynamic status were stable. Diaphragmatic respiration was adequate in maintaining sufficient level of oxygenation in 9 patients. 6 patients electively converted to general anesthesia with insertion of either Laryngeal Mask Airway (LMA) for assisted spontaneous ventilation in 3 cases or endotracheal tube for control ventilation in 3 cases due to dyspnoea and desaturation resulting from opening of pleura. There were no complications related to epidural anaesthesia. Nine of 15 patients completed the procedure awake.

Average length of ICU stay was 1 day (range 1-2). One of the converted cases was expired due to hypotension on 2<sup>nd</sup> post operative day. Perioperative variables are depicted in Table 1.

**Table-I**

<i>Perioperative variables</i>	
SVo2 (%)	98±1.38
Pco2 (mm Hg)	45±2
MAP (mm Hg)	115±25.2
Heart rate (beats/ min)	60±10
Epidural Solution(ml)	46±8
Operative Time (min)	300±30
VAS	2.6±0.3

Values are expressed as means±SD. Blood samples were taken at every 15 minutes during the operation.

SVo2, Arterial oxygen saturation; MAP, mean arterial pressure; VAS, visual analog score (0=no pain, 10=worst possible pain).

### Discussion:

Endotracheal general anaesthesia is the usual practice in cardiac surgery. High thoracic epidural anaesthesia might have beneficial effects in beating heart surgery, with or without general anaesthesia<sup>8</sup>. Thoracic epidural block yields cardiac sympathectomy resulting in vasodilatation of coronary and internal thoracic arteries, and bradycardia without hemodynamic compromise<sup>8</sup>. Other advantages include, attenuation of stress response, a favorable oxygen demand/supply ratio for the myocardium, preservation of the fibrinolytic system that might counter balance the procoagulant state observed after the beating heart surgery<sup>9,10</sup>, and the prevention of postoperative sustained atrial fibrillation are still matter of debate<sup>10,11</sup>.

Moreover epidural anaesthesia results in sensory block which gives advantages of effective pain control and facilitate earlier extubation. Contrary to our previous experiences aspirin is no longer discontinued before off pump CABG, irrespective of whether epidural anesthesia is used. The major drawback of thoracic epidural anesthesia is the risk of epidural hemotoma formation, which is estimated to be 1 in 150,000<sup>12</sup>. This complication can be avoided by a minimum time delay of 60 minutes between epidural puncture and heparinization and willingness to postpone surgical intervention for at least 24 hours if a bloody tap occurs<sup>3</sup>.

The epidural anaesthesia itself exerts a sedative effect on the patients. As the epidural block paralyzes the intercostal muscles, maintenance of diaphragmatic respiration is mandatory. Diaphragmatic paralysis which occurs at the C4 level, can be avoided by monitoring the development of Horner syndrome, indicating a block at the C6 level. Diaphragmatic respiration was adequate in maintaining sufficient levels of oxygenation. A moderate accumulation of CO<sub>2</sub> was noted without clinical significance.

Avoidance of a rebreathing mask and decreasing the dose of epidural anesthetic solution is sufficient to deal with hypercarbia. Pneumothorax was a dreaded complication. This problem will be overcome by quick repair of pleura if open within a stable period of about 5 to 6 minutes before respiratory distress and vigorous cardiac motion started. If this is not sufficient the pleura should be opened wide.

Avoidance of general anaesthesia enables mobilization of patients immediately after surgical intervention<sup>6</sup> and eliminate intubation and extubation related risk to ischemic heart disease patient.

Epidural anaesthesia also shortens ICU stay or avoid ICU experience which is not only beneficial for effective use of hospital resources but also contributes patients satisfaction significantly after CABG<sup>6</sup>.

### Conclusion:

CABG without general anaesthesia appeared to be safe for and satisfying to the patients. Moreover Thoracic Epidural offers many benefits over GA. It is not our intention to advocate the elimination of endotracheal general anaesthesia in routine off pump CABG. Our purpose is to facilitate the learning process towards performing cardiac surgery in a less invasive manner. Minimally invasive cardiac surgery

should go hand in hand with minimally invasive cardiac anaesthesia. Further study is required to define the possible extent and limitations of this strategy.

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## Outcome of Skin Graft in Postburn Finger Contractures: An Integrated Technique of Evaluation

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### Summary:

**Objective:** This prospective clinical study was conducted between July 2003- June 2005 at Dhaka Medical College Hospital, Dhaka, Bangladesh to make a comparative evaluation of the outcome of skin graft on patients of postburn contractures of the fingers using integrated scores for measuring several outcomes together.

**Materials & Methods:** A total of 56 subjects of postburn contractures of the fingers were selected consecutively and were evaluated at baseline by number of digits affected, surface area involved, extension deficit, fingers with maximum extension deficit and duration of contracture. Thirty two subjects were assigned to Full-thickness skin graft group (Group-A) and 24 to Split-thickness skin graft group (Group-B). Respective graft coverage was applied to the wound following release of contracture. Immediate outcome was evaluated in terms of graft take and number of graft-site complications, while follow up outcome was evaluated in terms of extension deficit six months after correction using specific scores for defined outcome.

**Results:** Over 70% of the subjects were < 15 years with mean ages of Group-A and Group-B were  $9.38 \pm 1.66$  and  $9.94 \pm 1.42$  years respectively. In both groups maximum extension deficit was found in little finger (78% in Group-

A and 54% in Group-B). The Interphalangeal (IP) joints were observed to be most frequently involved (78% in Group-A and 75% in Group-B). The duration of contracture, number of digits involved and surface area of the fingers involved were almost identically distributed between the groups. Outcome shows that donor-site morbidities (discolouration and hypertrophic scars) were significantly less in Group-A compared to that in Group-B ( $p < 0.001$  and  $p = 0.047$ ). Similarly the Group-A was significantly superior compared to Group-B in terms of minimal extension deficit ( $0 - 10^\circ$ ) 6 months after correction (59.4% vs. 25%,  $P < 0.05$ ). About two-third of the subjects in both the groups demonstrated 100% graft take and around 80% had 2 or < 2 graft-site morbidities. The excellent outcome was significantly higher in Group-A (37.5%) than that in Group-B (12.5%) ( $p < 0.05$ ).

**Conclusion:** Full-thickness skin graft is a better option of intervention than Split-thickness skin graft for coverage after release of contracture. However, the findings need to be validated by a larger sample size.

**Key words:** Postburn flexion deformity, full-thickness skin graft, split-thickness skin graft, graft take, donor-site morbidity, graft-site morbidity and extension deficit.

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### Introduction:

Hand is a highly specialized organ, as it has grasping pinching and hooking functions, carried out by musculotendinous unit. It can give information about position, size and shape of an object by its highly developed sensory mechanism and described as third

eye<sup>1</sup>. Hand function is grossly impaired if post burn deformity occurs, specially involving fingers and palm. For postburn deformity of hand, the goal of treatment is recovery of functionally acceptable digital motion with intact sensation<sup>2</sup>. There are several options of resurfacing after release of postburn contracture of fingers. Incisional release and grafting is usually preferable to excision and grafting, particularly if dorsal scarring is fresh and hyperemic<sup>3</sup>. As vast majority of burns result in loss of skin, replacement with skin graft rather than flap is the most appropriate method of coverage<sup>4</sup>. Full-thickness skin graft is usually recommended in preference to split-thickness skin graft for resurfacing after release of postburn contractures<sup>5</sup>. The present study was intended to make a comparative evaluation of the

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outcome of skin graft on patients of postburn contractures of the fingers using integrated scores for measuring several outcomes together.

### Materials & methods:

The study was conducted during the period from July 2003 – June 2005 at Plastic Surgery Department of Dhaka Medical College Hospital. A total of 56 patients were selected consecutively from the patients seeking treatment for postburn flexion deformity of fingers. The patients were evaluated at baseline by number of digits affected, surface area involved, extension deficit, fingers with maximum extension deficit and duration of contracture. Following random allocation procedure 32 patients were assigned to Full-thickness skin graft group (Group-A) and 24 to Split-thickness skin graft group (Group-B). Patients of postburn flexion deformity of fingers irrespective of age and sex, with scarring on the flexor surface of fingers and Volar contractures were included in the study. The criteria that refrained patients from participating were contracture over 100°, extensive scar demanding flap coverage and stiffness of joints.

With all aseptic precautions and after applying tourniquet, incision was made over the most contracted site and proceeded to the sides making it a 'fish-tail appearance'. In case of contracture bands a small 'Z' plasty was added. Release of contracture was done at the satisfactory level with preservation of digital vessels and nerves. Full-thickness skin graft was harvested from groin or upper and medial aspect of arm, while split-thickness skin graft was harvested from thigh. Respective graft coverage was applied to the wound. In case of full-thickness skin graft, donor site was closed intradermally and in case of split-thickness skin harvesting, only sterile dressings were applied on the donor site. In children < 12 years, immobilization was done by needle (22 gauge) in extensor subtendinous space. In patients 12 or > 12 years old, fingers were immobilized by Kirschner wire introduced through pulp and passing across the interphalangeal joint before placement of the graft on the recipient site.

Immediate outcome was evaluated in terms of graft take and number of graft-site complications. Follow up evaluation was done six months after correction. Outcome during follow up was evaluated in terms of extension deficit measured using a Goniometer. As there were several outcomes, it was difficult to decide which group had better outcome unless all the

outcomes were weighted together. Therefore, to compare the outcomes between the two groups, all the individual outcomes were scored based on their merits and added together to find an integrated score of 9 (Table I). The score 3 or below was considered poor and from 9 – 8 was considered excellent outcomes, while fair (5 – 4) and good (7 – 6) were in between them. The test statistics used to analyze the data were descriptive statistics Student's t-test, Chi-squared Test and Fisher's Exact Probability Test.

### Results:

The findings of the study showed that age, sex and other baseline variables were almost identically distributed in both the groups (Table II). More than 70% of the subjects were below 15 years of age with mean ages of Group-A and Group-B were  $9.38 \pm 1.66$  vs.  $9.94 \pm 1.42$  years respectively. Over three-quarter (78.1%) of the subjects in Group-A and two-third (66.7%) in Group-B had extension deficit from 45 – 90° with maximum extension deficit being in little fingers (78% in Group-A and 54% in Group-B) (Fig.1). The IP joints were found most frequently involved (78% in Group-A and 75% in Group-B). Both the groups were found almost identical with respect to duration of contracture ( $11.0 \pm 6.24$  vs.  $9.0 \pm 3.05$  months,  $p > 0.05$ ) number of digits involved ( $2.0 \pm 0.17$  vs.  $2.0 \pm 0.18$ ,  $P > 0.05$ ) and flexor surface affected ( $21.88 \pm 9.98\%$  vs.  $22.92 \pm 9.08\%$ ,  $p > 0.05$ ). About two-third of the patients in both the groups demonstrated 100% graft take. Around 80% of the patients in both the groups had 2 or < 2 graft-site morbidities. However, donor-site morbidities (in terms of discoloration and hypertrophic scars) were found to be significantly less in Group-A compared to Group-B ( $p < 0.001$  and  $p = 0.047$ ). Similarly the Group-A was observed to be significantly superior compared to Group-B in terms of minimal extension deficit (0 – 10°) six months after correction (59.4% vs. 25%,  $p < 0.05$ ) (Table III). The frequency of donor-site infection and recurrence of contracture were not significantly different between the groups ( $p > 0.05$ ). The integrated score showed that excellent outcome was significantly higher in Group-A (37.5%) relative to Group-B (12.5%) ( $p < 0.05$ ) (Table IV). The good, fair and poor outcomes in Group-A were 50%, 9.4% and 3.1% respectively, while in Group-B the same were 54.2%, 20.8% and 12.5% respectively (Fig.-2).

**Table-I**

<i>Scoring system for outcome evaluation</i>					
Outcome variables	Scores assigned				
	4	3	2	1	0
Graft take	-	-	100%	< 100%	-
Number of graft site complications	-	0-2	3-5	> 5	-
Extension deficit six months after correction	0-10°	11°-20°	21°-30°	31-40°	> 40°

**Table-II**

<i>Distribution of baseline variables between groups</i>			
Baseline variables	Group		p-values
	Group A (n = 32)	Group B (n = 24)	
Age (years)#	2.0 ± 0.17	2.0 ± 0.18	0.339
Sex¶			
Male	17(53.1)	15(62.5)	0.339
Female	15(46.9)	9(37.5)	
Duration of contracture (months)#	11.0 ± 6.24	9.0 ± 3.05	0.56
Proportion flexor surface involved (%)#	21.88 ± 9.98	22.92 ± 9.08	0.603
No. of digits involved#	2.0 ± 0.17	2.0 ± 0.18	0.339
Joints involved¶			
IP joints only	22(68.8)	18(75.0)	0.608
Both IP and MP joints	10(31.3)	6(25.0)	
Extension deficit (degree)¶			
45 – 90	25(78.1)	17(70.9)	0.392
> 90	7(21.9)	7(29.2)	

# Data were analysed using Mann-Whitney Test and were presented as mean @ SEM.

¶ Data were analysed using Chi-squared (χ<sup>2</sup>) Test and presented as frequency with corresponding (%).

**Table-III**

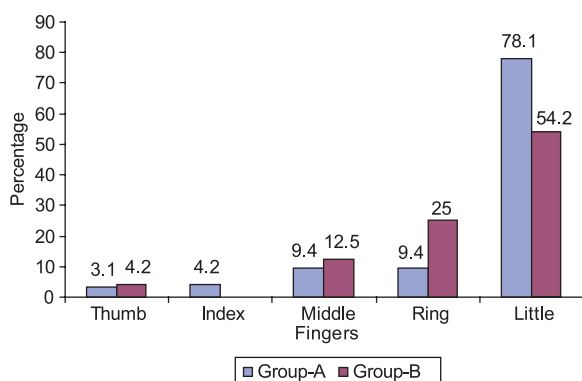
<i>Comparison of outcomes between groups:</i>			
Outcomes	Group		p-values#
	Group-A (n = 32)	Group-B (n = 24)	
Graft take (100%)	21(65.6)	16(66.7)	0.935
No. of graft-site morbidities (≤ 2)	26(81.3)	19(79.1)	0.747
Extension deficit 6 months after correction	19(59.4)	6(25.0)	0.034S
0 - 100	10(31.3)	15(62.5)	
11 - 200	3(9.4)	3(12.5)	
21 - 300			

# Data were analysed using χ<sup>2</sup> Test or Fisher's Exact Test and presented as n(%); S = Significant

**Table-IV**

Outcome variables	Highest scores	Scores attained by		p-values#
		Group-A (n = 30)	Group-B (n = 25)	
Graft take (100%)	2	1.66 ± 0.48	1.67 ± 0.48	0.937
Graft site morbidity	3	2.81 ± 0.40	2.79 ± 0.41	0.849
Extension deficit six months after correction	4	3.53 ± 0.62	2.96 ± 0.75	0.003
Total outcome	9	8.00 ± 1.50	7.42 ± 2.50	< 0.001

# Data were analysed using Student's t-test and presented as mean ± SD.



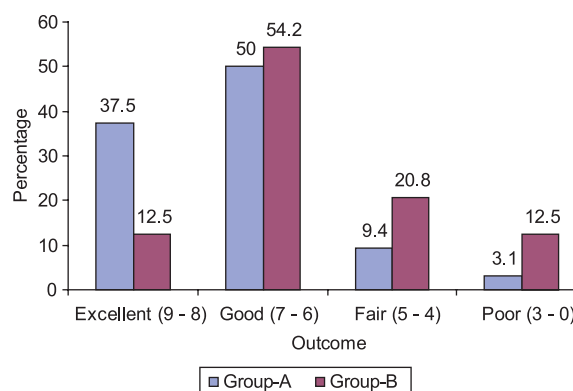
Percentage will not correspond to 100% because of multiple response

**Fig. 1:** Fingers with maximum extension deficit

#### Discussion:

Postburn flexion deformity of fingers is a common sequela of burn which demands restoration of manual function. The goal of surgical treatment as stated by Strickland *et al.*<sup>2</sup> should be the recovery of functionally acceptable digital motion with intact sensation.

In the present study, majority of the burn contractures of fingers was observed below the age of 15 years, (59.4% in full-thickness and 79.3% in split-thickness). The youngest one was 1 year and the oldest one was 38 years old. A male preponderance was observed in both the groups bearing consistency with the other studies<sup>6,7</sup>. Full-thickness skin grafts were found to achieve the best functional results, which are similar to the studies of other investigators<sup>5,8</sup>. About two-third of the patients in both the groups had 100% graft take which was almost consistent with findings of Alexander *et al.*<sup>8</sup>, where 91% of the patients had 100% graft take.



**Fig. 2:** Comparison of integrated outcome between groups

Donor-site morbidities were more frequently encountered by patients of split-thickness than those encountered by full-thickness; graft-site morbidities were almost equally distributed between groups (81.3 and 79.1% in full-thickness and split-thickness respectively,  $p = 0.747$ ). Recurrence of contracture was considerably higher in split-thickness (45.8%) compared to that in full-thickness (21.9%) ( $p = 0.057$ ). Pigmentary changes were almost similar in both the groups (78.1% and 75% in full-thickness and split-thickness respectively,  $p = 0.784$ ). The only disadvantage of split-thickness is its tendency to recur contracture, which was also found in the study of Iwuagwe *et al.*<sup>5</sup>. Among donor site complications, about 96% patients of split-thickness noticed discolouration which was completely absent in subjects of full-thickness ( $p < 0.001$ ). This is because the donor-site of group-A was primarily closed. Hypertrophic scar was also significantly lower in full-thickness than that in split-thickness ( $p < 0.05$ ).

Postoperative functional evaluation done six months after correction showed that about 60% of full-thickness had very minimum extension deficit (0-10°), In contrast, 62.5% of split-thickness showed moderate to severe extension deficit (11°-20°), indicating superiority of full-thickness over split-thickness ( $p = 0.034$ ). Similar result was also observed by the other investigators<sup>5</sup>, where they used full-thickness skin graft rather than split thickness skin graft. Alexander *et al.*<sup>8</sup> and Burn & Oh<sup>9</sup> also demonstrated similar results. However, some authors held completely reverse opinion. Their results suggested that there is no long-term functional advantage in the use of full-thickness skin graft to resurface the palmar surface following release of the burn scar. They felt that the use of split-thickness skin graft which provide identical long-term functional result are less deforming and are superior cosmetically.<sup>10</sup>

#### Conclusion:

The hand is frequently involved as a part of much larger burn complex. Due to inadequate and improper initial care, a superficial burn is usually converted into a deep burn by gross secondary infection leading to slow healing and protracted illness with resultant contractures and scarring of the soft tissue. The purpose of surgical treatment is to obtain the best result with least complicated procedure in minimum time. As the vast majority of burns results in loss of skin only, skin replacement with skin graft is the method of choice for resurfacing. As split-thickness skin graft frequently contracts following resurfacing,

full-thickness skin graft is the better option of coverage after release of postburn flexion contractures of the fingers. However, as the sample size was small in the present study, it requires to be validated by a larger sample size.

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## REVIEW ARTICLES

# A Clinical Review on Basic Management of War Injuries / Mass Casualties

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### Summary:

*Managing war injury is no longer the exclusive preserve of military surgeons. Increasing numbers of non-combatants are injured in modern conflicts, and peacetime surgical facilities and expertise may not be available. Although all resources are not always available, adherence to the basic management principles following ATLS guideline, can be made in injured patient care in any situation ranging from single person "Buddy" first aid through to major hospital multiple member trauma teams. This article addresses the management of war wounds including mass casualties by non-specialist surgeons with limited resources and expertise. The Initial measures for treating war casualties are similar to those for any severe injury. The warfare Injured patient management is performed into the*

### Introduction:

Managing war injury is no longer the exclusive preserve of military surgeons. All surgeons require a sound grasp of the subject. Increasing numbers of non-combatants are injured in modern conflicts, and peacetime surgical facilities with expertise may not be available<sup>1-2</sup>.

One of the hallmarks of war injury is the early lethality of wounds to the head, chest, and abdomen; therefore, limb injuries form a high proportion of the wounds that present at hospitals during conflicts<sup>3</sup>.

However, it is still appropriate to be aware of the "Gold standard" of management<sup>4</sup>.

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*following levels: a. Management at the site of incident. b. Management en-route to the hospital. c. Hospital management. The primary objectives of injury patient management are: 1. Rapid and accurate assessment of the patients' condition. 2. Resuscitation and stabilization. 3. Ensuring a smooth and rapid hospital transfer. Management is divided into four phases: a. Primary survey b. Resuscitation. c. Secondary survey and d. Definitive care. These proceed sequentially, with the exception that the primary survey and resuscitation should be started at the site of incident & usually proceed simultaneously, with life threatening situations being managed as soon as they are found. A repeat of the secondary survey (Tertiary survey) may also be performed 24 hours later.*

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### Aim

The aim of this clinical review article is to describe the sequence of events of managing war injuries including mass casualties with triage, resuscitation and initial wound surgery by non-specialist surgeons with limited resources and expertise.

### Objectives

- To understand the epidemiology of warfare injuries / mass casualties.
- To know the fundamentals of wound ballistics and injury mechanisms.
- To understand the principles of wound management.
- To have a sound grasp of initial management principles when dealing with mass casualties .

### Materials & Methods:

This review article has used the published literature, recent journals, and review of Surgery text books including my experience in management of mass casualties at Combined Military Hospital, Dhaka Cantonment, Bangladesh from 1999 to 2005. & also few war injuries at UNMIL in Jan 2006 to Feb 2007.

### Epidemiology

- Penetrating missile wounds, injuries from blast phenomena & burns are the typical features of

modern conventional war, civilian terrorists or urban guerilla warfare.

- Missile wounds are caused by bullets or by fragments from exploding bombs, shells & mines.

### Missile / Bullets Injury

**Low velocity missile injury:** e.g. Bullets from pistol traveling at 400 miles/sec which lacerates and crushes the tissues along the missile tract.

**High velocity missile:** e. g. Rifle bullets traveling at 1000-2000 miles/sec may give up more energy to cause temporary cavitations in addition to laceration and crushing of tissues. The extent of cavitations depends upon the density and elasticity of the target organ and is associated with tissue injuries many centimeters around the missile tract<sup>5-6</sup>.

### Features of Missile Injuries :

- Low energy causes limited injury .
- Cavitations in solid organs are often fatal .
- Cavitations in bone create secondary missiles .
- Cavitations in muscle create the dead culture medium.
- Devitalization of muscle surrounding the missile tract in the depths of the wound provides a perfect media for the growth of pathogenic bacteria which are sucked in from the entrance of the wound.

### Blast Injury

Wounding may also be inflicted by explosive munitions such as rockets, aerial bombardment, mortars, and grenades. A small volume of explosive is converted to a large volume of gas in a very short time. This results in high pressure at the point of detonation, leading to the acceleration of gas molecules away from the explosion, a so called blast wind, the leading edge of which is the shock front<sup>7</sup>.

**Primary blast injury** is typically experienced by casualties close to the explosion and is due to the interaction of this shock front on air-filled cavities within the body (middle ear, lung, bowel).

**Secondary blast injury** is due to impact on the body of items energized by the explosion. Modern munitions contain preformed metallic fragments;

lacking aerodynamic features, such fragments rapidly lose velocity, resulting in low energy transfer pattern wounds.

**Tertiary blast injury** is seen when the victim is accelerated by the blast and thrown against a fixed object such as a wall.

**Quaternary blast injury** is that caused by collapse of any building secondary to a blast event.

Victims of blast often have multisystem injury, complicated by the presence of blunt and penetrating injury and burns.

### Hall marks of modern war injury :

- The aim of modern warfare is to incapacitate, not to kill.
- Fragments are the commonest wounding agents in surviving casualties than a bullet.
- Multiple injuries to different body systems .
- The early & high lethality of wounds to the head, chest, and abdomen; therefore, limb injuries form a high proportion of the wounds that present at hospitals during conflicts.
- No characteristic war wound.
- Varieties of injuries require intuitive care.

### Trimodal Distribution of Death

- The most deaths occur within the first hour of injury, before the patient arrives at hospital are due to severe brain or cardiovascular injury for which counter measures are of very limited value.
- The second peak in deaths occurs, between 1-4 hours (golden hour) due to uncompensated blood loss, with competent accident service - most are preventable.
- The third peak mortality rate appears several weeks later due to late complications of trauma and multiple organ failure.

So it is very important to evaluate the injuries according to the severity with well-defined stages.

### Management

- Initial measures for treating war casualties are similar to those for any severe injury<sup>8</sup>.
- In warfare injuries, patient numbers may for a time exceed the capacity of medical teams to

render normal care. Under these circumstances, it is necessary to sort casualties on the basis of need so that available resources and personnel can render the ‘most for the most’, to quote an American military surgeon. This is ‘**triage**’ and it is outlined below.

- Triage is a dynamic process and needs to be repeated at each level of care from point of injury until arrival in hospital.
- In general, field triage is for evacuation to the hospital.
- Once in hospital, triage is for access to resuscitation and to operating rooms.

#### **The Primary Objectives of Injury Patient Management**

1. Rapid and accurate assessment of the patients’ condition.
2. Resuscitation and stabilization.
3. Ensuring a smooth and rapid hospital transfer.

#### **The management is performed into the following levels:**

1. Management at the site of incident.
2. Management en-route to the hospital.
3. Hospital management.

#### **Management at the site of injury:**

At this level a swift and co-ordinate management is required. Medical staff and resources should reach the scene of injury at the earliest possible times. Then takes an adequate patient history and account of incident with triage and start the life saving management simultaneously following ABCDE of ATLS guideline.

The doctor arriving at the scene should be able to ensure patent airway, adequate ventilation, arrest haemorrhage, combat shock, splint fractures and transport to the nearest hospital<sup>9-11</sup>.

#### **The Advanced Trauma Life Support approach:**

Following the death of his wife and serious injury to his three children in an air crash in the 1970s, an American orthopaedic surgeon, Dr. James Styner, introduced a structured trauma management training program which was soon adopted by the American

college of Surgeons and developed into the ATLS educational package now in widespread use in the UK and in other countries.

This approach is now regarded as the gold standard in early trauma initial assessment and resuscitation.

ATLS management is based on a ‘treat lethal injury first, then reassess and treat again’ strategy.

#### **The Steps in the ATLS philosophy**

1. Primary surveys with simultaneous Resuscitation—identifies & treat what is killing the patient.
2. Secondary survey — proceeds to identify all other injuries.
3. Definitive cares — develop a definitive management plan.

#### **Elements of the primary survey & resuscitation**

Airway with cervical spine protection

Breathing and provision of oxygen

Circulation with control of bleeding

Dysfunction of the central nervous system

Exposure in a controlled environment

#### **Airway with cervical spine protection**

1. Initial assessment of the airway patency is to ask for answer a question.
2. Unconscious patient with breathing difficulties, the angle of the jaw is pulled forwards and the head extended. A finger may be inserted in to the mouth to ensure that breathing is not being obstructed by the tongue, false teeth, or any foreign body.
3. The cervical spine should be maintained in a neutral position, with manual immobilization by a second person if necessary (i.e, during orotracheal intubation).

#### **Breathing and provision of oxygen**

Breathing may be inadequate.

- a. High-flow oxygen using reservoir mask.
- b. Inspection of neck & chest – Evidence of wound, surgical emphysema or tracheal deviation with the conditions of neck veins, symmetry of the chest, respiratory effort & rate to be noted.

- c. Percussion & Auscultation
- d. Tension pneumothorax– A clinical diagnosis; no time for radiographs!  
Immediate decompression, with insertion of a needle into the pleural space in the MCL two fingerbreadths below the clavicle, followed by insertion of a chest drain.
- e. Open wound of the chest wall (Sucking wound) should be covered with a three-sided dressing strapped firmly in position followed by immediate insertion of an intercostal drain.

### Circulation with control of bleeding

1. **Haemorrhage control:** External bleeding can usually be stopped by pressure bandage or firm pad.
2. **Cardiac tamponade** - Life-threatening condition.  
Beck's triad for diagnosis - Muffled HS, Reducing BP, Distended neck veins  
A cardiac needle through subxyphoid approach aiming for the angle of left scapula & aspirating with a syringe.
3. **Hypovolumic shock** - \*Intravenous access \*Permissive hypotension \*Timely surgical intervention.

### Disability/Dysfunction of the central nervous system

Rapidly reviewing neurological status, with AVPU scale

**A** – Alert

**V** – Response to Voice

**P** – Response to Pain

**U** – Unresponsive

Or a quick **GCS**, and **Pupillary** size with response to light.

### Exposure in a controlled environment

1. **Fracture splintage:** A fractured arm can be easily splinted by bandaging it to the trunk and leg by tying it to the other limb<sup>12</sup>.
2. **Care of spine:** Twisting and flexion must be avoided. The patient should be carried on to a stretcher by three persons “in one piece” to

avoid further damage to the spine.

3. **Transfer:** The aim should be for rapid and smooth transfer of patients from the scene of the incident to a hospital that is well equipped and adequately staffed, with trained personnel to deal quickly and efficiently with all of the injuries encountered.

A ‘scoop and run’ policy is best where transfer time to hospital is short.

A ‘stay and play’ policy may be required in the face of entrapment but prehospital personnel must be properly trained and equipped.

### Management enroute to the hospital:

Resuscitation and evaluation continues at this stage of management.

Following management should be undertaken -

- care of airway
- ensure ventilation
- arrest of bleeding
- fluid replacement
- relief of pain by analgesics
- wound care

### Management in Hospital:

After severe injury the risk of falling into second mortality peak with death occurs from ‘hypovolumic shock’. This period is the golden hour during which effective resuscitation can save a life. There are 3 stages of care in the emergency room, ICU, OT and post-operative ward.

### General Principle of Management (4 R):

1. Resuscitation
2. Review
3. Repair
4. Rehabilitation

### Resuscitation

**Ensure patent airway - If airway is not checked earlier**

- Obstructing element should be removed.
- Reflexes present → Airway tube.
- Reflexes absent → Low pressure cuffed ETT.

- Tracheostomy / Emergency Cricothyroidotomy:  
-awake emergency cricothyroidotomy is a rapid, relatively easy and relatively safe procedure in a cooperative patient who requires an urgent definitive surgical airway.

### **Breathing and provision of oxygen**

#### **Ventilation may be inadequate.**

- High-flow oxygen using reservoir mask.
- Inspection of neck & chest – Evidence of wound, surgical emphysema or tracheal deviation with the conditions of neck veins, symmetry of the chest, respiratory effort & rate to be noted.
- Percussion & Auscultation

#### **Immediately Life-Threatening Injuries**

- Airway obstruction
- Tension pneumothorax
- Open pneumothorax
- Massive haemothorax
- Flail chest
- Cardiac Tamponade

**Tension pneumothorax**– A clinical diagnosis; no time for radiographs! Immediate decompression, with insertion of a needle into the pleural space in the MCL two fingerbreadths below the clavicle, followed by insertion of a chest drain.

**Open wound of the chest wall (Sucking wound)** should be covered with a three-sided dressing strapped firmly in position followed by immediate insertion of an intercostal drain.

**Massive haemothorax** – (more than 1.5 liters of blood) causes shift of the mediastinum, compression of the lung on the effected side, with reduction of breath sound & hypovolumic shock – a surgical emergency & operative control of bleeding is required<sup>13</sup>.

**Flail chest** requires endotracheal intubation and positive pressure ventilation.

**Cardiac tamponade** -Life-threatening condition.

Beck's triad for diagnosis - Muffled HS, Reducing BP, Distended neck veins

- A cardiac needle through subxyphoid approach aiming for the angle of left scapula & aspirating with a syringe.

### **Circulation**

External haemorrhage may be controlled by pack, pressure and bandage as a temporary measure followed by emergency exploration and haemostasis.

The potential internal sites of haemorrhage are chest, abdomen, retroperitoneum and into muscle compartments in fracture of long bones, pelvis etc must be identified (aphorism-`blood on the floor & four more`).

#### **Control of haemorrhage is more important than aggressive fluid resuscitation.**

#### **General Measures:**

It should be continued and side by side a head to toe evaluation should be done.

- Wide bore i.v. canulation and fluid replacement – any fluid, until blood is replaced.
- CVP line
- Analgesia – Best narcotic analgesics by i.v. route
- Antibiotics
- ATG
- Immobilization – Fracture by splint
- NG tube & Bladder catheterization (don't place a U. catheter if urethral injury is suspected)
- Assisted ventilation (if necessary)
- O2 administration

### **Review**

#### **Adjuncts to the primary & secondary survey**

- Assessment.**
- Monitoring:** ECG, Non-invasive BP & Pulse oxymetry.
- Physical Examination:** A careful top to toe survey of the undressed & stable patient must be done. Care must be taken to identify any truncal penetrating injury, without forgetting the back and buttocks, perineum, and axillae.
- Special tests :** -
  - Blood is obtained for cross-matching, haematocrit & biochemistry.
  - X-ray for suspected fracture or FB chest.
  - Other special tests according to injury [FAST, CT scan/MRI, DPL].

**Tertiary Survey** – Maul & his colleagues have introduced the concept of the tertiary survey in an attempt to reduce the incidence and morbidity of missed injuries. When the 'dust has settled' after major trauma & the patient is in the surgical intensive care unit, the tertiary survey consists of another head-to-toe examination and a review of all available laboratory and imaging results.

### Repair

#### Aims:

- Restore intravascular volume
- Restore CO and distribution
- Ensure gas exchange
- Ensure renal perfusion

#### Arrangement of injuries in order of priority

##### Highest priority:

1. Cervical spine injury.
2. Respiratory impairment.
3. CV insufficiency.
4. Severe external bleeding.

##### High priority:

5. Intraperitoneal and retroperitoneal injuries.
6. Brain and spinal cord injuries.
7. Extensive soft tissue injury.

##### Low priority:

8. Lower gut injury.
9. Peripheral vessels, nerves, tendon injury.
10. Fracture dislocation.

### Definitive Treatment

#### Wound Assessment (Limb wounds):

Each wound must be assessed and recorded as follows:

- Site and size
- Presence of a cavity and degree of contamination
- Anatomical structures that may have been injured
- Distal perfusion
- Presence of fractures
- Whether a limb is reconstructable or not.

**Wound Exision** : The entrance and exit wounds should be explored to see the depth of tissue damage. Foreign bodies; e. g. mud, pieces of cloth, metal fragments of mine, shell, bomb, grenade etc are removed but it is not necessary to remove every piece of small fragments/splinters<sup>14-17</sup>.

- Dead muscle is dusky in colour, shows little tendency to bleed, and does not contract to forceps pressure, must be excised. Where there is doubt about the viability; the bruised muscle should be excised.
- Neurovascular bundles in the wound tract are to be identified.
- Severed nerves are marked with sutures but repair should not be attempted at this stage. Nerves may be repaired later on or in case of loss of segment may be repaired by free graft or pedicle graft.
- Major artery or vein damages must be repaired. If tension is likely; a reversed vein graft may be inserted to bridge the arterial gap and the repair must be covered by muscle.
- Tendon repair should not be performed at this stage. Tattered ends should be trimmed.
- Bones may be shattered by high velocity missile.
- At operation most of the fragments will be found to have attachment to the periosteum or muscle. On no account fragments are discarded because loss of bone may result in nonunion or limb length discrepancy.
- Internal fixation not to be employed at the time of initial surgery.
- External fixation is very useful where there is soft tissue loss.
- Joints should be thoroughly explored and irrigated with saline and foreign body should be removed. Any exposed articular cartilage should be covered by synovium, muscle or skin.
- Traumatic amputations should be surgically tidied, completed at the lowest level possible & the skin left open for delayed primary closure.
- At the end of the procedure the wound should be washed with copious quantities of saline and then left open.
- Apply a dry, bulky, sterile dressing, and the patient can be returned to the ward for continued monitoring and analgesia.

**Delayed primary closure:**

- If the wound shows no signs of infection, necrosis, or residual contamination, it can be closed by suture or a split skin graft/flap.
- However, multiple debridement may be required:
  - in an ICRC series of amputations, only 45% were suitable for closure at first relook, with 33% of cases needing one further debridement and 22% needing two or more <sup>18-23</sup>.

**Principles of Gunshot / Missile Injury Surgery:**

- Preserve skin
- Divide fascia
- Repair vessels not nerve
- Remove dead tissue
- Stabilize bone with external fixation
- Clean and close joint cavities
- Leave wound open for delayed primary closure within 4-7 days after injury

**Wounds of the head:**

High velocity missile wound of the brain is lethal.

The management of low velocity penetrating wounds depends initially on the maintenance of airway and restoration of blood volume in order to maintain adequate oxygenation of brain.

Indriven bone fragments may be raised and wound excision is carried out by gentle irrigation and suction to remove necrotic brain and bony fragments.

Dura is to be closed by piece of temporalis fascia.

Intermittent positive pressure ventilation assists in reduction of intracranial pressure by reducing brain swelling.

**Chest Injuries:**

90% of the chest wounds can be treated by drainage of the pleural cavity by formal tube thoracostomy and excision of the wounds in the chest wall.

Formal thoracotomy is most urgently indicated for:

- > 1.5 L initial blood loss
- Continued haemorrhage from tube drain (> 200 ml/hour)
- Suspected mediastinal injury.
- Persistent air leak.
- Retained foreign body > 1.5 cm diameter in the lung.

**Abdominal Injuries:****● Abdominal missile wounds**

- Every penetrating & perforating missile wound of the abdomen should be explored by a full midline laparotomy with early Resuscitation, NG tube & Bladder catheter.
- Laparotomy may be the part of resuscitation without any time for planning ( Damage control surgery).
- Firmly packing with gauze swabs to arrest bleeding.
- Sequentially removal of packs & carrying out a thorough inspection.

**● Liver injuries:** - In 50% cases who survive to reach a surgical centre bleeding stops spontaneously.

- Manual compression & perihepatic packing / damage control surgery
- In suitable situations, finger fracture with exposure of bleeding points followed by individual ligation, or more formal resection procedures with adequate external drain may be needed.

**● Splenic & pancreatic injury:**

- Damage to the spleen & tail of pancreas may require resection, although splenic conservation in the form of partial resection, suture repair or mesh wrapping has become an accepted practice in recent years in certain circumstances.
- Missile injury of the head of pancreas is usually fatal. In a very few cases it may be possible to apply a Roux loop of jejunum to create an internal fistula.

**● Mesenteric tear and small gut injuries** may require bowel resection and anastomosis.**● Colonic or rectal injury-** ? Mandatory faecal diversion

- For most injuries of right colon - Primary repair or resection is satisfactory except where severe wounding with extensive contamination.
- On left side – One stage procedure may be done if favourable circumstances exist;e.g, minimal peritoneal contamination, limited blood loss & a time interval <8 hrs.

- In pelvic injuries, difficult haemostasis may require ligation of the internal iliac artery.
- **Renal injuries:** -May be treated conservatively. Immediate nephrectomy is seldom required. A divided ureter may be repaired 'over pigtail' stent.
  - For bladder and urethra – urethral catheter should not be placed if urethral injury is suspected, suprapubic cystostomy and placement of retropubic drain after wound excision is needed.
- **Peritoneal toilet**– Using warm saline, it is important to assist the removal of all spilled bowel contents & blood clots.
- **Closure**- The laparotomy wound is closed by mass closure technique. The missile entrance & exit wounds should be excised as described earlier & left open initially with a view to delayed primary closure at 4-6 days<sup>24-25</sup>.

#### **Indications of laparotomy in blunt abdominal trauma patient:**

- Evidence of hypovolemia or ongoing internal bleeding not responding to the treatment.
- Tense, tender, distended silent abdomen
- X-ray revealed pneumoperitoneum
- Fracture in 9,10,11 ribs on left side or lower ribs
- FAST – haematoma, collection, internal organ injury
- Fracture pelvis with intra-peritoneal bladder injury with clinical evaluation
- Peritoneal lavage (DPL) revealed – blood, bile, faecal matter

#### **Post Operative / Surgical Intensive Care Unit**

- Secondary haemorrhage
- Abdominal compartment syndrome
- Second look surgery
- Sepsis
- Multi organ failure
- Nutrition
- Fluid therapy

#### **Rehabilitation**

- Aim is to minimize the functional impairments or disabilities along with the impact of the social and environmental consequences of those impairments.
- An effective management requires co-ordination between the patient, carers, medical therapy, nursing, psychological staff and social services to facilitate the maximum potential independent and productive living for disabled people within the community.

A comprehensive rehabilitation is extremely challenging and resource intensive, but can be tremendously rewarding<sup>26-28</sup>.

#### **Conclusion:**

Managing potentially large numbers of combat casualties, a collaborative / team approach involving health professionals (doctors, nursing staffs, paramedics, first aid cadres, stretcher bearers / transporters) throughout the chain of care is required in all conventional war or peacekeeping and counter-insurgency missions. A break in the chain at any point is likely to affect outcome adversely.

Although all resources are not always available, adherence to the basic management principles following ATLS guideline, can be made in injured patient care in any situation ranging from single person "Buddy" first aid through to major hospital multiple member trauma teams.

The rapid initial assessment and resuscitative management should be started at the site of incident following ATLS guide line and to be continued during transportation, which should be smooth and rapid to a nearest and well equipped hospital, where early care with emergency surgery can save life & limb.

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# Umbilical Cord Blood (stem cell) Banking

J RAHMAN

## Summary:

*Umbilical cord blood (UCB) is a source of premature haemopoietic stem cells (HSC) and progenitor cells which has a tremendous capacity to differentiate into another type of cell. Many malignant and non-malignant disorders are being treated with the transplantation of the UCB cells. This precious thing is usually discarded. But it can be easily and safely collected, cryopreserved and stored in a cord blood bank. UCB banks are being established in many countries of the world. Two models of cord blood banking systems are available—one is Family or private banking where UCB is stored for the benefit of*

*the donor or their family and another is non-profitable public banking where UCB is stored for research purpose and for allogeneic unrelated transplantation. About seventy diseases can be treated with UCB transplantation. But, there are many debates regarding cord blood transplantation and legal and ethical issues cause to concern. However, UCB has become an established alternative to bone marrow transplantation in children and young adults.*

*Key word: Stem cell, cord blood banking, stem cell transplantation.*

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## Introduction:

Stem cells are at the forefront of one of the most fascinating and revolutionary areas of biology today. Scientists are rapidly discovering many revolutionary uses for stem cells, because they have the unique capability to either multiply or develop into other cell types<sup>1</sup>. Stem cell transplantation is an accepted curative therapy for many malignant and non-malignant conditions affecting children and adults<sup>2</sup>. Umbilical cord blood (UCB) has become a widely accepted alternative source of hematopoietic stem cells (HSC) for transplantation. UCB banks are fundamental to support this increasing clinical activity.<sup>3</sup> But, its use in adults is restricted because of low absolute HSC numbers. To overcome this obstacle, expansion of HSC in co culture with feeder cells is a promising possibility<sup>4</sup>. To date, more than 5,500 cord blood stem cell transplants from unrelated donors and several hundred from sibling donors have been performed worldwide<sup>5</sup>.

**Background of cord blood transplantation:** During 1970s, researchers discovered that umbilical cord blood could supply the same kinds of blood-forming (hematopoietic) stem cells as a bone marrow donor. And so, umbilical cord blood began to be collected and stored. The first successful cord blood transplant took place in France in 1988, for a child with

Fanconi's Anemia, a rare congenital anemia. Again in 1991, a transplant was performed on a child with chronic Myelogenous Leukemia. Both transplants were successful, opening the door to cord blood transplantations for situations in which traditional bone marrow had been routinely used. Since then, approximately two-thirds of the cord blood transplants performed have been for malignant conditions, while the remainders have been done for a variety of genetic blood disorders. Overall, cord blood transplants offer a high rate of success, which continues to grow as the number of transplants rises<sup>1, 5, 6</sup>.

## What is Cord Blood?

Cord blood is the blood that remains in the umbilical cord and placenta following birth, which is usually discarded.

## What does umbilical cord blood contain?

Cord blood contains Hematopoietic stem cell. These proliferative cells have greater proliferative and colony forming capacity than the stem cells obtained from bone marrow or peripheral blood and are more responsive to some growth factors. They are more native than proliferative cells from bone marrow; they seem to produce fewer complications associated with some aspects of HSC transplantation<sup>7</sup>.

Reports suggest that not only are mesenchymal and neural precursor cells present but that some cord blood cells, may have the capacity to develop into many different lineages including cartilage, fat

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cells, hepatic and cardiac cells. Research is still at an early stage and despite the amount of interest in the field<sup>8,9</sup>.

### **What Are Stem Cells?**

Stem cells are called the master cells or mother cells of the body which can be differentiated into other kind of the cells. They can be collected from the bone marrow, peripheral blood, and embryo and from umbilical cord blood. Cord blood stem cells have tremendous capacity to differentiate and proliferate into any type of cells and it is being used in the treatment of many life threatening diseases.

### **Source of Stem Cells for Transplantation:**

**Adult Stem Cells:** Adult stem cells are found in *bone marrow* and require invasive surgery to acquire. Also, finding a matching donor for a bone marrow transplant is difficult and sometimes impossible. Currently, peripheral blood is the most common source of stem cells for transplant. *Peripheral bloodstream cells* (PBSCs) are blood-forming stem cells released from the marrow into the bloodstream. But, the marrow releases only a small number of these stem cells into the blood. The number is too small to allow collection of peripheral blood stem cells for transplantation. So, to obtain enough stem cells from the peripheral blood for a transplant, prior chemotherapy or use of growth factors is needed to administer to a donor. The cells are collected from the blood using a process called Apheresis<sup>5,10</sup>.

**Embryonic Stem Cells:** Embryonic stem cells can be derived from an embryo, but it is highly controversial and often draws many moral and ethical debates.

**Umbilical Cord Blood Stem Cells:** Cord blood stem cells are collected from the umbilical cord and placenta after a baby is born. Cord and placental blood contain large numbers of blood-forming stem cells. Umbilical cord blood offers a perfectly natural method of acquiring stem cells. Cord blood stem cells offer many advantages over other stem cells. They are collected in a risk-free, five-minute procedure at the time of birth that is painless for both mother and baby. Also, stem cells from cord blood are better than stem cells from bone marrow because they are less prone to graft vs. host disease (GVHD – an immune system attack by donor cells against the recipient) and other

complications relating to rejection of foreign cells. Most importantly, banked cord blood is available when needed; allowing treatment to begin almost immediately, without time spent searching for a match. Moreover, cord blood stem cells are a perfect match for the baby and can potentially be used to treat other family members<sup>5</sup>.

### **What is cord Blood Banking?**

Preserving a newborn's stem cells for potential medical uses to treat life-threatening diseases is called **cord blood banking**. Cord blood banking involves several steps including collection, processing and storage<sup>11</sup>.

**Umbilical cord blood collection:** Cord blood collection is simple and painless and almost risk free for the mother and baby. Immediately after the delivery of the baby, the umbilical cord is clamped and the baby is separated from the cord. Cord blood can be collected in two ways—Syringe method and bag method. In syringe method, a syringe is used to draw blood from the umbilical cord. The process is basically same as drawing blood for a blood test. By bag method the needle attached to the collection bag is inserted into the vein in the umbilical cord. The placental blood/umbilical cord blood, drawn by gravity, then flows into the collection bag which is equipped with an anti-coagulant to keep the blood from clotting before it reaches the laboratory. The syringe or bag should be pre-labeled with a unique number that represents that particular baby. Cord blood may only be collected during the first 15 minutes following the birth and should be processed by the laboratory within 48 hours<sup>6,12</sup>.

### **Amount of blood**

An adequate cord blood collection requires at least 75 ml in order to ensure that there will be enough cells to be used for a transplantation<sup>1</sup>.

### **How cord Blood is processed and stored?**

After cord-blood collection has taken place, it is taken by courier service to the cord-blood bank. There the sample is given an identifying number. Then the stem cells are separated from the rest of the blood on the basis of their total nucleated cells (TNC) and CD34(+) cells and are stored **cryogenically**( cooled with liquid nitrogen)<sup>13</sup>. Cord blood stem cells are

stored in six cryovials. Thereby, it is not necessary to draw the entire specimen at once; thus it offers the potential for multiple usages. The cryovials are designed specifically for long-term cryogenic storage<sup>6, 12, 14</sup>.

#### **How long can cord blood cells be stored?**

According to published research blood-forming stem cells stored up to 15 years can be used in transplants<sup>15</sup>. In fact, stem cells appropriately frozen and stored in liquid nitrogen are viable for an indefinite period. Cord blood samples have been preserved for as long as 10 years and have still been successfully transplanted<sup>5</sup>.

#### **Types of cord blood banking?**

Cord blood banking is of two types—Private or Family or directed banking and another is Public or non-directed banking:

A private bank (for-profit) offers the opportunity to bank exclusively for the donors and their family making the stem cells available when needed those most and allowing treatment to begin almost immediately without time spent searching for a match. Again, cord blood stem cells are a perfect match for the baby and can potentially be used to treat other family members<sup>12, 16</sup>.

Where as, a public bank (non-profit) takes in donations for use of the greater public and research.

#### **Public versus private banking**

There has been debate about whether it is appropriate or necessary for individuals to store their child's cells in private commercial stem cell banks<sup>17-20</sup>. The causes for arguments against the necessity of private banking are:

The individual's chances of using personal cord blood for haematopoietic disorders before the age of 20 years is low; estimates used vary from 1/2000026 to 37/100000 (i.e. 1/2700)<sup>21</sup>.

Own cells may be inappropriate in conditions where the disease has a genetic origin, including some leukemia, and patients would be better served by a source other than their own-banked cells.

#### **Cost of cord blood banking**

There are usually two fee associated with cord blood banking: The first is the initial fee which includes

enrollment, collection and storage for the first year. The second is an annual storage fee. The initial fee will range from \$ 900 to \$ 2100 depending on the predetermined period of storage. Annual storage fees beyond the initial storage fee are approximately \$ 100<sup>1, 12</sup>.

#### **Advantages and disadvantages of the use of cord blood:**

The availability of cord blood as an alternative to bone marrow as a source of HSC for allogeneic transplantation has a number of potential *advantages*. For example, Patients can receive cord blood transplantation earlier than those receiving conventional bone marrow grafts<sup>23</sup>. Again, Cord blood transplantation will tolerate a mismatch of tissue types between donor and the recipient greater than is acceptable with bone marrow or peripheral blood. Moreover, there is lower incidence and severity of graft versus host disease and viral transmission; in particular, cytomegalovirus and Epstein-Barr virus

The *disadvantages* of cord blood transplantation include: low numbers of haemopoietic progenitor cells and stem cells in each cord blood donation, which may cause delayed engraftment. This deficiency is being addressed by the use of multiple units of cord blood for transplantation, and by efforts to expand the progenitor pool. Lack of availability of subsequent donations of stem cells and/or lymphocytes from the graft donor in graft failure or disease relapse<sup>24</sup>. It is possible that genetic diseases may be present but not apparent at the time of birth and could be transplanted to a patient via donor cord blood stem cells<sup>5</sup>.

**Diseases treated with cord blood stem cells:** Nearly seventy diseases can be treated with the transplantation of bone marrow. Most of the bone marrow failure disorders, hemoglobinopathies, histiocytic disorders, inherited immune system disorders, inherited metabolic disorders, leukemia and lymphomas, myelodysplastic/ myeloproliferative disorders, plasma cell disorders and some malignancies can be treated with umbilical cord blood transplantation. Moreover, research is going on for the treatment of Alzheimer's, Parkinson's, heart and liver disease, diabetes, muscular dystrophy, spinal cord injury and stroke.

**Cord Blood Stem Cell Expansion:**

Umbilical cord blood stem cell expansion is currently an experimental procedure where a collection of stem cells in the laboratory are placed in a growth medium and allowed to reproduce, thereby increasing the number of available cells. The cell dose of cord blood grafts remains of critical importance for speed of engraftment and survival after unrelated cord blood transplantation from unrelated donors, particularly in adults. A minimum total nucleated cell dose of  $2.0 \times 10^7$ /kg recipient body weight is essential and most centers use a threshold much higher than this. In some cases, this procedure may be necessary to provide sufficient number of cells for transplant<sup>25, 26</sup>. The stem cells have been shown to reproduce *in vitro* (in the laboratory) just as they do in own bone marrow. Some studies have shown cell expansion has increased the number of stem cells up to 100 times the original number. Cell expansion is the key for recovering enough cells to treat an adult patient<sup>12</sup>.

**Logistical issues:**

There are a number of practical issues that give cause for concern. A considerable logistic burden is imposed on the obstetrician or midwife and the hospital for cord blood storage. The consent procedure, associated paperwork and collection procedure place an additional load on already overstretched midwifery staff. The cord blood can become contaminated with bacteria during collection unless stringent precautions are taken to avoid this<sup>27</sup>. The use of midwifery or medical staff for cord blood collection may distract them from the care of other mothers and babies and routine maternal or neonatal observations may be neglected<sup>24</sup>.

Beside these there are some specific issues in the third stage call for attention. For example: early cord clamping appears to be disadvantageous to the *preterm infant*. Preterm babies are at risk of anaemia and haemodynamic instability. From a systematic review of seven randomized controlled trials there is some evidence that 30–120 seconds delay is associated with fewer transfusions for anaemia and fewer intraventricular haemorrhages.<sup>28</sup>

*Cord around the neck* may also need to be released or cut early to allow delivery. There should be no pressure on attendants to avoid cutting the cord.

Standard practice *at caesarean delivery* is to clamp the cord immediately and pass the infant to an attendant, then deliver the placenta, and proceed to repair the uterine incision. Rapid action minimizes maternal blood loss from surgery. So it will be inappropriate to do undue delay in collection of cord blood where there is increased risk of haemorrhage.

The logistical burden of collection increases at *twin* and high order *multiple deliveries*. The accoucheur's attention has to be more focused on minimising adverse fetal outcome and postpartum haemorrhage during the time of cord blood collection. Again, identifying which cord blood is associated with which infant in non-identical multiple births is necessary if the cord is for autologous use<sup>24</sup>.

**Legal and ethical issues:***Legality of parental consent to take cord blood*

When the child is delivered, it becomes a person legally and the parents' right to dictate what shall be done to the child is coterminous with the child's best interests. The parents cannot demand that anything be done to the child that may have the effect of putting the child at risk, unless it is in the best interests of the child. This applies to the birth attendants as it does to the paediatrician. However, legally, the placenta is part of the body of the mother rather than the child. Either parent is competent to give consent to anything done to or for the baby but only the mother can give consent to anything done to her own body, including cord blood collection<sup>24</sup>.

*Decision to donate:* decision to donate cord blood for use by other individuals is made by the mother as the cord blood, being taken from the maternal side of the clamp, is not part of the independent child's body. The decision to donate to the community should be taken by the mother in the best interests of the society.

*Privacy* is of special concern, since the source of the blood is the newborn, and it is widely agreed that it would be inappropriate to perform any genetic tests on the blood that would not be directly in the interests of the child until he or she is 18 years of age or is able to make such decisions<sup>29,30</sup>.

*Whose blood is it?*

It has been suggested that the cord blood sample is more likely to be the property of the child on the basis

that it is developmentally, biologically and genetically part of the child.<sup>17, 31</sup> On the other hand; once the cord is cut it is mother's property. So the cord blood consigned to storage may be the subject of a gift from the mother to her child depending on the terms of the consignment.

As a result, autologous low-risk commercial storage is unlawful in Italy and discouraged in some other European states. In 2004, the European Group on Ethics in Science and New Technologies advised European Commission that: 'The legitimacy of commercial cord blood banks for autologous use should be questioned as they sell a service, which has presently, no real use regarding therapeutic options. Thus they promise more than they can deliver. The activities of such banks raise serious ethical criticisms'. The group did not go as far as recommending banning this activity but they also recommended that: 'any kind of advertising made by commercial cord blood banks in the media, including on the Internet, must be adequately controlled by public authorities'. They recommended that 'support for public cord blood banks for allogeneic transplantations should be increased and long-term functioning should be assured'.<sup>21</sup>

In Canada, the Fetal Medicine Committee of the Society of Obstetrician and Gynaecologists recommended that Canada should establish registration, regulation and accreditation of cord blood collection centers and banks and those commercial cord blood banks should be carefully regulated.<sup>22</sup>

Royal College of Obstetrics and Gynaecology strongly supports the concept of an NHS Cord Blood Bank for allogeneic storage of donated cord blood and would like to see it well funded. However, it remains unconvinced of the benefit of personal commercial banking for low-risk families.

**The RCOG offers the following specific recommendations to them who decide to support cord blood collection:**

- a. There should be no alteration in 'usual management' of the third stage.
- b. To maximize safety for the mother and infant, collection should be made from the ex utero separated placenta.
- c. Collection should be by a trained third party (that is, not by the attending obstetrician or midwife) using appropriate methods and facilities

- d. The service should not be made available in cases where the attending clinician believes it to be contraindicated: this will be likely to include all premature births and cases where there appear to the attendants to have specific contraindications, such as nuchal cord or maternal haemorrhage.
- e. The details of the hospital's policy should be made available to all patients.

#### **Conclusion:**

Umbilical cord blood has become an established alternative to bone marrow transplantation, especially in haematological, immunological and metabolic storage disorders in children and young adults. In addition to those life-saving capabilities, research is already uncovering cord blood stem cell applications in the treatment of Alzheimer's, Parkinson's, heart and liver disease, diabetes, muscular dystrophy, spinal cord injury and stroke. In Bangladesh, we are far away from this practical method. But Scientists working in blood bank; haematologists, obstetricians as well as social workers need to think and work together regarding the possibility of the establishment of this valuable program.

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## CASE REPORTS

# Pneumatosis Cystoides Intestinalis - A Case Report

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### Summary:

*Pneumatosis Cystoides Intestinalis is a rare condition characterised by gas-filled cysts in the wall of the small-gut and sometimes in its mesentery. When the process is limited to the large intestine, the term pneumatosis coli is used<sup>1</sup>. The exact cause of the condition is unknown but it may develop in diseases like peptic ulcer, ulcerative colitis, regional enteritis, chronic bronchitis etc<sup>2</sup>. The condition is usually diagnosed incidentally during abdominal scanning or investigation for the primary disease. Presentation as a case of gastric outlet obstruction (proximal jejunal obstruction) as happened in this case, is*

### Introduction:

Pneumatosis Cystoides Intestinalis may be primary (Idiopathic) or secondary to conditions like peptic ulcer, ulcerative colitis, regional enteritis, diverticulitis etc<sup>2</sup>. Impaired pulmonary functions (who are less able to excrete excessive hydrogen gas through lungs) can be a contributing factor. It is believed that air enters into the wall of gut through a breach in mucosa, as would occur in the case of a duodenal ulcer and the air is driven onwards by

*rare. A young adult male cultivator presented as a case of gastric outlet obstruction due to suspected chronic duodenal ulcer ( a common complication of Peptic ulcer disease in our country ). Per-operatively, gas filled cysts in proximal jejunum with almost obliteration of the lumen of the intestine was detected and diagnosed as a case of pneumatosis cystoides intestinalis and was treated with resection and anastomosis of the affected portion of gut. The patient is in good health even 5 years after the operation and showed no signs of recurrence of the condition.*

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peristalsis. The cysts which may be obvious on plain radiograph and are usually symptomless<sup>3</sup>. The patient may seek advice for his primary disease in most cases but may also present with features of sub-acute or chronic intestinal obstruction<sup>4</sup>. At its initial stage, the condition can be treated with hyperbaric O<sub>2</sub> inhalation. If a large number of cysts occlude the lumen of the intestine, resection of the affected portion of intestine is necessary.

### Case Report:

A 35 year old young man with thin body-built from Gopalganj district was brought by a general physician, working in an Non Govt. Organization (NGO).

The patient was a poor cultivator from a remote rural area. He was complaining of pain in the upper abdomen for about 4 years. Initially the pain was mild and was felt in empty stomach and was relieved after taking antacids and H<sub>2</sub>-blockers. The abdominal pain increased in severity since about 2 years and drugs like H<sub>2</sub>-blockers and antacids were of no value. Since about 1 year, he noticed distension of upper abdomen along with pain after food intake and sometimes he used to vomit and get relief. If he fails to vomit voluntarily, he introduces his right index and middle fingers into his throat to induce vomiting, to get relief of the intolerable abdominal pain. He vomits ½ to 1

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hour after intake of solid food and sometimes after taking semi-solid or even after liquid meals since last 6 months and gradually became cachectic. The vomited material contained undigested or partially digested food eaten 2 to 3 days earlier, with offensive smell. He never had haematemesis. His bowel habit was once or twice daily with mucous in stools but never had melaena. The patient was a heavy smoker and used to smoke 10 to 15 biri or low priced cigarettes in a day. He used to cough occasionally with white mucus expectoration but never had haemoptysis. He was treated as a case of chronic duodenal ulcer by a physician for the last 6 months but without improvement

On examination, the patient was cachectic. He was not anaemic, not jaundiced and not cyanosed. His vital signs were within normal limit. Chest showed no deformity. Heart and lungs were normal. Liver and spleen were not palpable. Distension of upper abdomen was noticed and was more pronounced after water intake and visible peristalsis from epigastrium to downwards were noticed. On percusso-auscultation, the stomach was enormously dilated. Succussion splash was positive. There was no palpable abdominal mass.

His TcDc, Hb%, Urine examination, x-ray chest and E.C.G. were done from a Medical College Hospital and all were normal. Ba-meal examination was also done from the same institute showed hugely dilated stomach with Barium-streaked food particles inside.

Ultrasonography of whole abdomen, done from a private clinic, reported that his stomach was hugely dilated with shadows of food particles inside (without any mention about the cysts). All other abdominal and pelvic organs were normal.

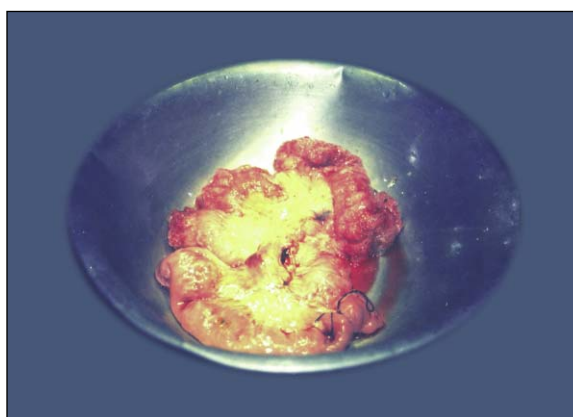
The patient was diagnosed as a case of gastric outlet obstruction due to chronic duodenal ulcer. Being a poor man and on the assumption that the diagnosis was already made, endoscopy was not done. Finally, the case was diagnosed as gastric outlet obstruction due to chronic duodenal ulcer and a decision was taken for vagotomy and gastro-jejunostomy after confirmation of fitness for general anaesthesia by the anaesthetist. Laparotomy was done through upper midline incision which was later extended downwards encircling right side of umbilicus.

Neither any ulcer-scar nor any tumour was detected in stomach or duodenum. Pyloric canal was normal. The

stomach was hugely dilated.

Large number of small cysts were found in the wall of proximal jejunum and its mesentery, sparing about 8 inches from duodeno-jejunal flexure and extending distally for about 2 feet from the starting point. The spared portion of jejunum, proximal to the cyst bearing portion was distended. The size of the cysts were ranging from few mm. to some cm. in diameter and were numerous and on pricking no fluid but only air was found inside. The lumen of the gut was almost occluded by cluster of cysts at two sites. All other abdominal and pelvic organs were normal. So, per-operatively, it was diagnosed as a case of sub-acute upper jejunal obstruction due to cluster of cysts and a decision was taken for resection of the affected portion of gut.

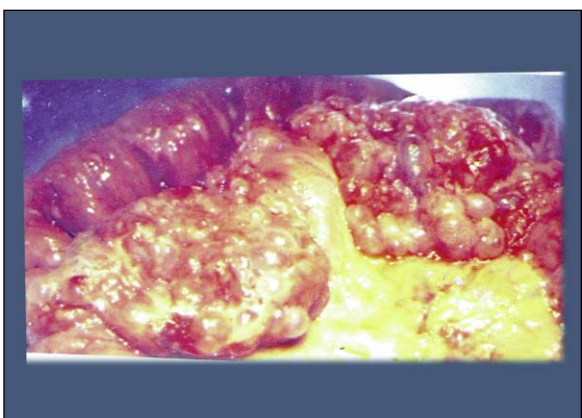
About 2 feet of the involved portion of proximal jejunum was resected and continuity restored with end to end anastomosis. The cysts on the resected portion of gut were not communicating with the intestinal lumen and with each other. A drainage tube was placed at the site of anastomosis and wound closed in layers after proper haemostasis. The drainage tube was removed on 3<sup>rd</sup> post-operative day. The patient was allowed to eat and drink, starting on 4<sup>th</sup> post-operative day, with liquid diet and gradually semi-solid and finally with solid food. There was neither vomiting nor abdominal distension. The wound healed normally and skin sutures were removed on 8<sup>th</sup> post-operative day and the patient was discharged from the clinic on 10<sup>th</sup> post-operative day.



**Fig.-1:** Resected portion of jejunum with pneumatic cysts.



**Fig.-2:** Resected portion of jejunum with pneumatic cysts.



**Fig.-3:** Close view of part of photo 2 showing the cysts clearly.

The histopathology report of the resected portion of jejunum showed sub-serosal as well as sub-mucosal cysts lined by flattened epithelium with granulomatous changes in stroma and infiltration by foreign body giant cells<sup>5</sup>

The patient is in good health even 5 years after the operation with no abdominal complaints. He can perform strenuous works including ploughing and rowing now.

#### Discussion :

Pneumatosis cystoides intestinalis, defined as gas in the bowel wall, is often first identified on abdominal radiographs or CT scans. It is a radiographic finding and not a diagnosis, as the aetiology varies from benign conditions to fulminant gastro-intestinal disease like necrotising enterocolitis in children<sup>6</sup>.

About 15% of cases of intestinal air cysts are primary ( i.e. idiopathic) and about 85% of cases are secondary to conditions like gastric or duodenal ulcers, enterocolitis, respiratory disease like bronchial asthma and chronic bronchitis, connective tissue disorders, coeliac disease, leukaemia, organ transplantation, amyloidosis, steroid therapy and in AIDS. Jejunio-ileal by-pass for obesity was found responsible in one series.

The condition can be explained :

- I. On the mechanical basis in association with -
  - (a) intestinal obstruction with mucosal ulceration .
  - (b) mucosal trauma from biopsy, endoscopy etc.
  - (c) respiratory disease with severe cough which raises intra-abdominal as well as intraluminal pressure of intestines and forces air to enter into the wall of the intestine<sup>7</sup> .
- II. On the basis of increased gas production as occurs in enterocolitis .
- III. On the basis of decreased gas excretion in chronic obstructive pulmonary diseases like Chronic bronchitis, bronchial asthma and pulmonary emphysema. Rupture of the pulmonary blebs may lead to air dissecting through the retroperitoneum into the mesentery and finally to the subserosa and submucosa<sup>8</sup> .
- IV. On the basis of increased mucosal permeability as occurs in steroid and immunosuppressant therapy.

In this case, gastric outlet obstruction was due to proximal jejunal partial obstruction, occurred by the gas filled clusters of cysts. No gastric or duodenal ulcer was detected. The patient was a heavy smoker having chronic cough but showed no signs of chronic obstructive pulmonary disease clinically and radiologically. So, it was a case of primary pneumatosis cystoides intestinalis with partial proximal jejunal obstruction but was wrongly diagnosed as a case of gastric outlet obstruction due to chronic duodenal ulcer. But possibility of secondary pneumatosis cystoides intestinalis due to duodenal ulcer with smoker's cough can not be excluded.

The presence of gaseous cysts was not noticed by the sonologist partly because of unawareness about the

condition and partly due to the presence of hugely dilated stomach with food particles inside<sup>9</sup>. CT-scan was not done considering its cost, lack of its easy availability at that time, and on assumption that a correct diagnosis was already made.

The type of gaseous content of the cysts could not be determined due to lack of facility. The follow-up of the patient could not be done at regular intervals due to lack of understanding its importance by the illiterate patient and inadequate postal service with a remote rural area of our country.

### Conclusion:

Pneumatosis Cystoides Intestinalis is usually diagnosed incidentally during abdominal scanning for the primary disease or for some other abdominal diseases. In its early stage, the condition can be treated with hyperbaric oxygen inhalation along with treatment of the primary disease. The condition rarely presents as a case of gastric outlet obstruction or intestinal obstruction. If the air-filled cysts cause intestinal obstruction, resection of involved portion of gut and end to end anastomosis gives excellent result. The primary disease also needs adequate treatment.

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## Laryngo-Tracheal Scleroma- A Case Report

BH SIDDIQUEE<sup>a</sup>, PG DATTA<sup>b</sup>, MS ALAM<sup>c</sup>, AK DEY<sup>c</sup>

### Summary:

*Scleroma is a granulomatous condition of the nose and other parts of the respiratory tract, usually primarily affects the nose and the nasopharynx (Rhinoscleroma). But rarely they also occur in the larynx (secondary to rhinoscleroma or primary laryngeal affection). This is endemic in Eastern Europe, North Africa, Southern Asia and Central America. In Bangladesh this is almost*

### Introduction:

Scleroma is a granulomatous condition of the nose, nasopharynx and other parts of the respiratory tract. This is an infectious disease having chronic but slowly progressive clinical course. The disease was first presented by Von Hebra<sup>1</sup>. Johann Von Mikulicz described the histologic features in 1877<sup>2</sup>, and Von Frisch identified the organism in 1882<sup>3</sup>. This is a bacterial disease caused by *K. rhinoscleromatis* (Frisch bacilli), that's why the disease is often called as Mikulicz disease and the culprit bacilli is known as Frisch bacilli. It is endemic in Eastern Europe, Northern Africa, Southern Asia and Central America<sup>4</sup>. Rhinoscleroma spreads in the environment by means of direct inhalation of droplets or contaminated materials. The disease probably begins in areas of epithelial transition such as the vestibule of the nose, the sub glottic area of larynx and the area between the naso and oropharynx. Because of slow progression and low degree of clinical suspicion (because of rarity), proper diagnosis is usually

*clinically unknown but theoretically possible. Presented case of laryngo-tracheal scleroma is possibly the first ever reported one from Bangladesh. The main presentation of this patient was laryngeal obstruction simulating malignancy and finally demanded tracheostomy. Only post surgical histopathology report could reveal the diagnosis.*

**Key words:** Scleroma, Laryngeal scleroma.

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delayed. The airway obstruction is usually mild but in neglected and advanced cases may be severe necessitating surgical intervention like tracheostomy. Review of available literature shows that, this case is possibly the first ever identified one of laryngo-tracheal scleroma in Bangladesh.

### Case Report:

A male patient of about 25 years had attended the head & neck clinic of Bangabandhu Sheikh Mujib Medical University Dhaka in early November 2006 with a history of change of voice for 4 months and mild but increasing dyspnoea for 2 months. While he was engaged in doing some investigations in subsequent few days as outdoor patient he suddenly



**Fig.-1:** Preoperative X-ray soft tissue Neck lateral view showing involvement of laryngeal cartilage & upper part of anterior wall of trachea

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the specimens were sent for histopathological examination. Larynx was closed keeping a stent inside for 6 weeks.

### Discussion:

Scleroma of larynx and/or trachea although mentioned in the literature, it is almost unknown in our clinical practice. Although his symptoms were simulating malignancy, multiple areas of involvement (pre vertebral soft tissue, laryngeal and tracheal) directed us to shift our attention to inflammatory disease of the larynx and trachea. But the diagnosis was not evident till the histopathology reports were available.

The disease process usually starts as rhinoscleroma and progress downwards to involve the larynx and trachea<sup>5, 6</sup>. Interestingly in our case nose and nasopharynx were healthy.

Primary laryngeal Scleroma is extremely rare<sup>7</sup>. As the nose and nasopharynx were totally symptom free and no crust or atrophic change were present, our case can be categorized as primary laryngeal Scleroma. The incidence of laryngeal Scleroma varies from 12% to 14%<sup>8</sup>. In presented patient both the larynx and upper trachea were involved. The lesion occurs most often in the subglottic region where the character of the mucosa changes from squamous epithelium to columnar epithelium.

There are numerous methods of diagnosing scleroma, such as the examination of a culture from the affected area, histopathologic study with special stains from the biopsy specimen, and serologic and immunochemical studies. Culture studies are diagnostic, but the limitation is that only 60% of the biopsy proven cases were positive for *K. rhinoscleromatis*<sup>13</sup>. Complement fixation tests and agglutination tests can be used, but they are diagnostic only when the Warthin-Starry stain displays numerous bacilli in the cytoplasm. The electron micrograph of the Mikulicz cells shows several vacuoles and *Klebsiella rhinoscleromatis*<sup>14</sup>.

Histopathologic determination of the scleroma is by far the most accurate and the most widely used method of diagnosis. The presence of Mikulicz cells, Russell bodies, plasma cells, lymphocytes, and gram-negative bacilli showing slimy mucopolysaccharide coating are not pathognomonic, but characteristic of the scleroma.

Treatment for scleroma must be intense and prolonged. Bactericidal antibiotics specially Rifampicin, Streptomycin and Tetracyclin are useful.

Some times local application of 2% solution of acriflavine produced a complete cure of disease in all its stages after 8 weeks.

Chemotherapy may be combined with surgery to re-establish the airway without causing further atrophic changes. In late cases where the disease has been eradicated plastic reconstructive surgery may be required<sup>15</sup>.

### Conclusion:

Scleroma, although very rare, is a known clinical entity affecting nose and other part of the respiratory tract. Manifestation of laryngeal scleroma may simulate malignancy. High degree of suspicion on the part of the histopathologist and clinician may help to establish the diagnosis of laryngeal scleroma.

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## Large Right Atrial Myxoma- An Uncommon Cardiac Tumor Needs Urgent Surgery

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### Summary:

*A middle aged man was admitted into National Institute of Cardiovascular Diseases with the complaints of intermittent syncopal attack, dyspnoea, low grade fever and headache. After admission, he was diagnosed as a case of right atrial (RA) myxoma by echocardiography. With all preoperative preparation, he was undergone surgery*

*under general anesthesia with cardiopulmonary bypass (CPB). About 9cm x 7cm myxoma was removed and severe tricuspid regurgitation (TR) was found by regurg test. De Vega annuloplasty of the tricuspid annulus was done. Recovery of the patient was satisfactory with disappearance of all symptoms.*

*(J Bangladesh Coll Phys Surg 2009; 27: 52-55)*

### Introduction:

Primary cardiac tumor accounts for only 0.0017% to 0.19% of unselected patients at autopsy<sup>1</sup>. Seventy-five percent of these tumors are benign; 50% are myxomas<sup>2</sup>. Of myxomas, 75% to 80% are located on the left side of interatrial septum<sup>3</sup>. The reported rates in Bangladesh<sup>4</sup> were 87.93% left atrial, 8.62% right atrial, 1.72% biatrial and 1.72% right ventricular myxoma. Prior to the development of cardiac catheterization in 1951, intracardiac tumors used to be diagnosed only at autopsy<sup>2</sup>. Since then echocardiography has replaced cardiac catheterization as the mainstay of diagnosis, because of its non-invasive advantages<sup>2</sup>.

The gross appearance of cardiac myxoma is variable<sup>5</sup>; however, they are generally polypoid,

mostly pedunculated, round or oval with a smooth surface, often covered with thrombus<sup>6</sup>. Cardiac myxomas are usually attached at the level of fossa ovalis of interatrial septum and located in left atrium<sup>7</sup>.

The first successful excision of left atrial myxoma was reported in 1951<sup>1</sup>. Right sided cardiac myxomas present to surgeons with a technical challenge because placement of the cannula for cardiopulmonary bypass can be difficult<sup>2</sup>.

Presented case demonstrates an atypically large (9cm x 7cm) cardiac myxoma attached to the right atrial wall.

### Case Report

A male of 45 years, cultivator, hailing from Cox's Bazar was admitted into NICVD on 21/11/2006 with the complaints of intermittent syncopal attack for 1 month, dyspnoea for 1½ months and low grade fever, malaise and headache for 2 months. The fever was irregular in nature and was not associated with cough or hemoptysis. His dyspnoea occurred mostly while he lies on bed, but was not relieved by sitting upright. It also occasionally aggravated by exertion. He had no history of asthma or tuberculosis. During last 1 month, he began to have syncopal attack 2 to 3 times a day. Occasionally, it was associated with convulsion, palpitation and tightness of chest. He had no history of diabetes mellitus, hypertension or smoking.

For these above complaints, he was admitted into a Medical College Hospital on 5/11/2006 and was

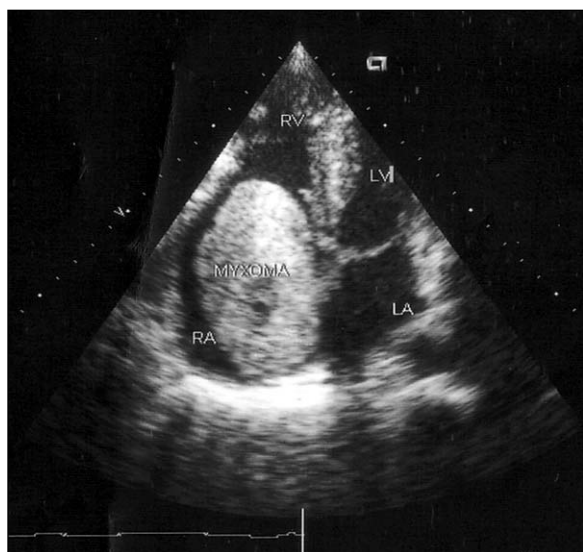
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treated by anti-epileptic drugs. But as the symptoms did not improve, he was referred to Dhaka Medical College Hospital on 14/11/2006. He was empirically diagnosed as a case of cerebral malaria and was treated as such. But as the symptoms did not improve, an echo was done and was diagnosed as a case of right atrial (RA) myxoma and was referred to NICVD on 21/11/2006. Examination finding on admission (in NICVD) were: Appearance- ill looking, confused, pulse- 100/min, B.P- 100/70 mmHg, neck veins-engorged, diastolic murmur at tricuspid area, lung-clear, no jaundice, edema, enlarged lymph node or clubbing. Per abdominal examination revealed normal. Reevaluation was done in Cardiology Unit- I on 23/11/2006. Chest X-ray and ECG were within normal limit. 2D Echo (Fig-1) shows a large mass in right atrium- protruding into right ventricle. Other baseline investigations were within normal limits. He was then submitted urgently to SU-III for emergency surgery.



**Fig.-1:** 2D echocardiography

On 25/11/2006, under general anesthesia with cardiopulmonary bypass (CPB), open heart surgery was performed. CPB time was 96 min and cross clamp time was 52 min. Per-operative findings and procedures were- A huge (9cm × 7cm) encapsulated mass (Fig-2), occupying 2/3rd in RA and 1/3rd in right ventricle (RV). It was attached to the limbus of fossa ovalis by a narrow stalk. Careful removal of the



**Fig.-2:** The mass (myxoma) after removal.

mass was done to avoid pulmonary embolism with adequate tissue surrounding the stalk. RA & RV cavity was washed with normal saline. The annulus of the tricuspid valve (TV) was found to be dilated. Peroperative valve regurge test showed severe tricuspid regurgitation (TR). De Vega annuloplasty of TV was done by 3/0 prolene. Patient was kept under artificial ventilation and was extubated on the following morning. ICU outcome was smooth, but needed inotropic support with Dopa & Dobuta for 2/3 days. Histopathology report was consistent with myxoma (Fig-3). Post operative Echo showed TR grade- II, which was acceptable. Post operative pulmonary function was normal.

Finally, he was feeling well, all parameters were within normal limit and the neurological and constitutional symptoms disappeared.



**Fig.-3:** Histopathology was consistent with myxoma.

**Discussion:**

Right atrial myxoma accounts for only 15% to 20% of all cardiac myxomas<sup>2</sup>. It is usually found at the interatrial septum<sup>1</sup>, at the border of fossa ovalis. Atypical locations and multiple myxomas occur most frequently in case of familial myxoma<sup>8</sup>. The location also may be biatrial with atrial septal defect (ASD)<sup>9</sup>. Our patient's tumor was attached to the limbus of fossa ovalis by a narrow stalk in the right side of interatrial septum. This is a rare site of origination<sup>1</sup>, but family history was absent in presented patient.

Myxomas can present in any age group, but it occurs most often between the 3<sup>rd</sup> and 6<sup>th</sup> decade of life<sup>1, 10</sup> as also in presented patient. In another report<sup>7</sup>, most of the sporadic myxomas are in females with mean age of 50. In a report of Bangladesh<sup>4</sup>, 51.72% were male and 48.28% were female with patient's age ranged from 14 to 65 years. Presented case was a male of 45 years.

Myxomas are usually polypoid and pedunculated<sup>1</sup>. But in this patient, though it was pedunculated by a narrow stalk of about 1cm width and 6mm long, its surface was smooth, like an encapsulated mass with globular shape. In 2D echocardiographic evaluation, the presence of an attachment stalk allows to differentiate a myxoma from other masses<sup>7</sup>.

The size of the tumor varies. Rogland et al<sup>7</sup> reported a myxoma sized 2cm x 2cm; Gupta et al<sup>11</sup> described 8cm long tumor and Yazici et al<sup>12</sup> reported 6.3cm x 5.2cm myxoma. Ours' was larger than all of those which was about 9cm x 7cm.

The tumor may have a considerable mobility at echocardiogram<sup>2</sup>, as also found in this case- which was even protruding into RVOT (right ventricular outflow tract) obstructing pulmonary circulations. The myxoma from left atrium (LA) may pass through ASD into RA and protrude into the TV producing Wrecking ball effect<sup>9</sup>. Mobile myxomas often exacerbate shortness of breath when patient assumes a particular posture<sup>13</sup>, which was also present in presented patient. The motion of the tumor can damage atrioventricular valve and rupture the cordae<sup>1</sup>. In this case, the annulus of the TV was found to be hugely dilated with severe TR; which was repaired by De Vega annuloplasty.

Anemia and high ESR can be explained by continuous destruction of erythrocytes due to the "ball-valve" movement of the mass<sup>1</sup>. But in presented patient, there was no anemia but had high ESR of 58 mm in 1<sup>st</sup> hour (westergreen). The absence of anemia may be due to smoothness of the tumor.

Constitutional symptoms, including fever, malaise, weight loss and myalgia, are common in patients with myxoma and have been attributed to the findings that myxomas release cytokine interleukin-6, which is responsible for inflammatory and autoimmune manifestations<sup>13</sup>. All these were present in presented case patient, which disappeared after removal of the mass. Syncope is an extremely rare finding, and is likely due to intermittent complete occlusion of the tricuspid valve<sup>11</sup>. The syncopal attack was present in this patient & disappeared after resection of the tumor.

There are reports of recurrence after excision, mostly in multiple, familial myxomas<sup>2, 8, 14, 15</sup>. But as presented patient had no family history and it was single, the chance of recurrence is minimal. Quashem et al<sup>4</sup> also found no recurrence in their series. In familial cases, Carney's complex, an autosomal dominant disease, there may be association of spotty skin pigmentation and endocrinopathies<sup>6, 8, 16</sup>. These symptoms were absent in this case, hence no chance to be a case of such.

The reported rate of left or right sided embolic phenomena associated with cardiac myxoma ranges from 21% to 33%<sup>16, 17</sup>. In a report of NICVD<sup>4</sup>, overall 17.24% patients had clinical evidence of systemic embolism. In left sided myxomas, 21% to 33% may have systemic embolism and right sided myxoma have 2 to 24% chance of pulmonary embolism<sup>14, 17</sup>. In presented patient, no evidence of pulmonary embolism was found and post operative pulmonary function was normal.

**Conclusion:**

Right atrial myxoma presents with a divergence of symptoms and make a diagnostic dilemma. An echocardiogram is invaluable to diagnose such a disease. Treatment should be done by immediate surgical removal- which will reduce morbidity and mortality. The disgraceful symptoms will also be dramatically disappeared after surgical treatment.

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# COLLEGE NEWS

(J Bangladesh Coll Phys Surg 2009; 27: 56-58)

## Schedule of Continuing Professionals Development Lectures during October to December, 2008

Date	Time	Topic	Speaker	Chairperson / Moderator
14-10-08 Tuesday	12-10 pm to 1-00 pm	TEA  Chronic complications of Diabetes Mellitus	Dr. Wasim Md. Mohsinul Haque Registrar, Nephrology BIRDEM	Professor Khwaja Nazim Uddin (Chair.P), Professor of Medicine  Dr. Md. Faizul Islam Chowdhury (Chair.P) Associate Professor of Medicine  Dr. Shamim Ahmed (Moderator)
28-10-08 Tuesday	11-00 am to 11-50 am  11-50 am to 12-10pm  12-10 pm to 1-00 pm	Preterm premature rupture of fetal membrane and feto- maternal out come  TEA  Mullerion Abnormality	Dr. Rabeya Akther Assistant Chief Medical Officer   Dr. Irin Parveen Alam	Professor Kohinoor Begum (Chair.P), Professor & Head, Dept. of Obst. & Gynae  Dr. Laila Parveen Banu (Chair.P) Assistant Professor of Obst. & Gynae  Dr. Suraya Ahmed Chowdhury (Moderator)  Professor Rahima Begum (Chair.P) Professor of Obst. & Gynae  Professor Hosne Ara Begum (Chair.P) Professor of Obst. & Gynae  Dr. Nazlima Nargis (Moderator)
04-11-08 Tuesday	11-00 am to 11-50 am  11-50 am to 12-10pm  12-10 pm to 1-00 pm	Practical problems during management of Diabetes mellitus  TEA  Problems in the management of Tuberculosis	Prof. Khwaja Nazim Uddin   Dr. Jamal Uddin Ahmed	Professor Zafar Ahmed Latif (Chair.P) Professor of Medicine (Endocrinology)  Dr. Syed Mohammad Arif (Chair.P) Associate Professor of Medicine  Dr. Abdul Momen (Moderator)  Dr. Md. Abdul Jalil Chowdhury (Chair.P), Professor of Medicine  Professor Md. Mustafizur Rahman (Ch.P) Director & Professor of Respiratory Medicine  Dr. Rajashish Chakraborty (Moderator)

<b>Date</b>	<b>Time</b>	<b>Topic</b>	<b>Speaker</b>	<b>Chairperson / Moderator</b>
<b>11-11-08</b> Tuesday	11-00 am to 11-50 am	Management of Intra Cranial Haemorrhage	<b>Prof. Rashiduddin Ahmed</b>	<b>Professor Md. Wahiduzzaman</b> (Chair.P) Consultant, Neuro-Surgery
	11-50 am to 12-10pm	TEA		<b>Professor Sk. Sader Hossain</b> (Chair.P), Professor & Head, Dept. of Neuro-Surgery
	12-10 pm to 1-00 pm	Overview of Pain and its management		<b>Professor Sakhawat Hossain</b> (Chair.P) Professor of Neuro-Medicine
				<b>Dr. Md. Raziul Haque</b> (Moderator) Assistant Professor of Neuro-Surgery
				<b>Professor Abul Basher Mohammed Muksudul Alam</b> (Chair.P) Professor of Anaesthesiology
				<b>Dr. Md. Kabir Uddin</b> (Moderator)
<b>18-11-08</b> Tuesday	11-00 am to 11-50 am	Intensive Insulin Therapy in Critically Ill Patients	<b>Lt.Col(Dr.) Mamun Mostafi</b>	<b>Professor Mohammad Omar Faruq</b> (Chair.P) Professor of Critical Care Medicine& Senior Consultant
	11-50 am to 12-10pm	TEA		<b>Dr. Brig. Gen. Md. Rabiul Hossain</b> (Chair.P) Chief Physician Specialist in Medicine
	12-10 pm to 1-00 pm	Liver Disease in Pregnancy		<b>Dr. Ahmedul Kabir</b> (Moderator)
				<b>Professor Kohinoor Begum</b> (Chair.P) Professor of Obst. & Gynae
			<b>Dr. A.K.M. Shamsul Kabir</b>	<b>Dr. Swapan Chandra Dhar</b> (Chair.P) Associate Professor , Dept. of Gastrointestinal Diseases
				<b>Dr. Humaira Alam</b> (Moderator) Asstt. Prof. of Obst. & Gynae

<b>Date</b>	<b>Time</b>	<b>Topic</b>	<b>Speaker</b>	<b>Chairperson / Moderator</b>
<b>25-11-08</b> Tuesday	12-10 pm to 1-00 pm	TEA  Endocrine emergencies	<b>Dr. A.K.M. Musa</b> Assoc. Prof. of Medicine	<b>Professor Md. Taiabur Rahman</b> (Chair.P) Professor of Gastroenterology (Retd.)  <b>Professor Md. Anisur Rahman</b> (Chair.P) Professor of Gastroenterology  <b>Dr. Md. Shahabul Huda Chowdhury</b> (Moderator)
<b>02-12-08</b> Tuesday	11-00 am to 11-50 am	Ocular Trauma and management Update	<b>Prof. Dr. Md. Arif Mian</b>	<b>Professor Md. Humayun Kabir</b> (Chair.P) Prof. of Ophthalmology (Retd)  <b>Dr. Md. Hazrat Ali</b> (Chair.P) Associate Professor of Ophthalmology  <b>Dr. Ashraf Sayeed</b> (Chair.P) Associate Professor of Ophthalmology
	11-50 am to 12-10pm	TEA		
	12-10 pm to 1-00 pm	Management of Facial Trauma- An Overview	<b>Dr. S.M. Anwar Sadat</b>	<b>Professor Motiur Rahman Molla</b> (Chair.P) Chairman, Dept. of Oral & Maxillofacial Surgery  <b>Prof. Mohiuddin Ahmed</b> (Chair.P) Head, Dept. of Oral & Maxillofacial Surgery  <b>Dr. Mujibur Rahman Howlader</b> (Moderator) Associate Professor

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