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Published by: Prof. Abdul Aziz for  
 Prof. F.U. Baqai, Baqai Postgraduate  
 Medical Institute, IIIIC, 1/12, Nazimabad,  
 Karachi

**Address for correspondence:** Editor JSP  
 c/o Director RTMC, Surgical Publications,  
 c/o College of Physicians & Surgeons  
 Pakistan, 7th Central Street Defence  
 Housing Authority Karachi, Tel. 5890029 &  
 Fax: 5887333

**Subscription rates:** Per copy-in  
 Pakistan Rs. 100/= in SAARC countries  
 U.S. \$20, in other countries U.S. \$30.  
 Annual: in Pakistan Rs. 300/= in SAARC  
 countries US \$ 60, in other countries  
 U.S. \$90.

**Layout by:** Atoemuddin Siddiqui,  
 Kamran Abdullah Khan,  
 Fazil Khan

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## **EDITORIAL : TEACHING AND PRESENTATION OF INFORMATION**

Learning can be achieved by self-acquisition of knowledge by reading, use of computer learning programs and by active instruction through lectures and tutorials. This editorial will outline the aspects of presenting information from which audience and participants can gain maximum benefit.

Lectures are a useful way of providing new information and thus may have a place in imparting knowledge to students. They are also a useful way of conveying information to large audiences. Unfortunately they are not necessarily the best source of learning. Concentration span of the audience is often limited, tending to decrease after 15-20 minutes unless the speaker is particularly good and pays attention of his presentation technique. If lectures are more than 20-30 minutes the lecturer must employ methods to renew interest periodically to help his audience maintain concentration. This can be achieved by periodically allowing questions, separating the topics, breaking the lecture with a short alternative presentation such as a video, using appropriate anecdotes, but ensuring that they are not distracting by changing the audience's line of thought to continue thinking about them when the lecture continues.

The rate of delivery is important. Lectures delivered too quickly do not allow the audience time to think about new points raised, and if the audience is unfamiliar with the speaker's language or accent then the content will be lost on them. Key points should be highlighted and the lecturer should pause briefly after making them so that the audience has time to absorb them.

Visual learners as opposed to auditory learners benefit from good visual aids. Slides should be presented in large clear lettering using the whole area, not putting too much information on one slide and ensuring that the colours used can be easily seen when a slide is projected from the back of a large hall. White or yellow on a dark background usually shows up well. Generally red is not a good colour for slide. Complex tables and graphs cannot be absorbed rapidly. It is better to extract the key information and present it simply leaving the table to a published presentation. Do not have long sentences on the slide and then read them and avoid pointing word by word with a laser pointer – It is bright, the speaker's hand is often shaking and pointing to words while reading is something that usually occurs in primary school. Beware of slides which distract attention, particularly when used with dual projection as they may take the audience's mind off the topics being presented. Fancy backgrounds, pretty scenery, complex art with the words superimposed may all be distracting. So is the "wake up" slide with, for instance, a man with a pretty girl on a sandy beach, palm trees, blue sky and water – would not it be nice to be there!

Dual projection is rarely used well. Its best application is to have descriptive text on one side explaining an illustration on the other.

Dual projection to provide more space for information to be exhibited at one time is distracting. Only use it if it makes your presentation distinctly clearer. Remember more confusion with projection occurs than with a single projector.

For smaller groups tutorials or discussion groups are very effective because they involve audience participation. The question/answer tutorial technique is particularly useful because the question posed can form the basis of the discussion in the tutorial. Each person prepares a summary answer to the question so that they have had time to think about it and have all put some intellectual effort into the session before it begins. The headings and different approaches taken can be considered and organized into a logical order and the whole group can be involved in the discussion filling in the detail. It is important when conducting a tutorial to pose the question before asking someone to answer it and one should never simply go around the circle as individuals will then be in a position to relax after they answered their question. All attendees should be drawn into the discussion and dominance by one or two individuals should be avoided.

Considering some of the problems and positive way of dealing with them hopefully will help people to improve their teaching and lecturing abilities and thereby enhance the quality of education and continuing educational meetings.

**TCK BROWN,  
Melbourne**

# REHABILITATION OF PATIENTS WITH POST POLIO PARALYSIS AND DEFORMITIES

A. MOEED KAZI, ANISUDDIN BHATTI, ABDUL MAJID, GHULAM MEHBOOB,  
NABEELA SOOMRO AND NASIR A. MALIK

## ABSTRACT:

Six hundred and fifty patients with Post polio residual weakness and deformities were managed with the aim to correct and minimize their deformities and help them to be ambulatory, independent and useful members of the society. Age range of patients at presentation was 1.5 years to 26 years; average 11.38 years. Male to female ratio was 1.7:1. Age of onset of the disease in 70% of the patients was between 6 months to 3 years. 71.65% patients were non-vaccinated or incompletely vaccinated at the time of disease onset, whereas 28.30% children developed paralytic polio-myelitis despite complete vaccination; however, in these children severity and duration of acute illness was short or afebrile as compared to vaccinated group. 35 children had upper limb weakness, 15 of these had isolated upper limb involvement and 20 were associated with lower limb weakness. Lower limb weakness and deformity was noticed in 635 children. 470 patients were operated for surgical correction of deformities and tendon transfers. 180 patients were continued on non-operative treatments, 31.11% of them improved with use of Braces while 67.77% remained unchanged. Total 206 patients required various types of braces.

**KEY WORDS:** Paralytic Poliomyelitis, Residual weakness, Prevention of deformities, Rehabilitation

## INTRODUCTION

Unfortunately, in the developing countries polio-myelitis and its sequelae are still a major threat to public health. Prior to introduction of Expanded Program of Immunization (EPI) in 1978, nearly "20,000 children" in Pakistan developed paralytic poliomyelitis every year. Now "almost 70% to 80% of Pakistani children have been protected with help of polio vaccination". However, an epidemic of poliomyelitis occurred in 1993 "with 1803 reported cases of Acute Flaccid Paralysis"<sup>1</sup>. After 1994, with the start of "Global campaign to eradicate polio by year 2000" with continued routine immunization (EPI) coverage, by holding "national polio immunization days" (NID), and doing house to house polio vaccination campaign for "mopping up" wild polio virus, the number of paralytic polio cases has decreased to "350-550 reported cases each year in 1994-1996"<sup>1,2</sup>. The actual number may be higher

Epidemiological surveillance system is incomplete in our country as well as in other neighbouring countries. WHO estimates that "80,000" cases of paralytic polio-myelitis occurred in 1995. According to the WHO report; "Bangladesh, India and Pakistan together account for two third of all polio cases reported annually world wide"<sup>2,3</sup>. An

estimated prevalence of polio-myelitis (wild virus infection) in India has been quoted as "10 per 1000"; whereas, Europe and America have "entered in the Vaccine era and wild virus infection is rarely observed"<sup>4,5</sup>. During 1995 & 1997, sporadic outbreaks have occurred in Sheikhpura (1995), Bannu (1997), Quetta (1997) and Sawat (1997), despite three pairs of NIDs<sup>1</sup>. To eradicate polio by the year 2000, we have to greatly strengthen the planned NID's to ensure that over 95% children under 5 years are vaccinated and wild polio virus transmission is stopped.

90 to 95% of children infected with wild polio virus, develop asymptomatic infection. Approximately, 4-9% develop minor disease abortive polio-myelitis indistinguishable from other viral infection or a clinical picture of aseptic meningitis, whereas, only 1% develop major disease that is acute flaccid paralysis (AFP). Of these 1% individuals with AFP, 50%, develop residual paralysis ranging from mild to moderate and severe impairment<sup>4,6,7,8</sup>. Most of the patients achieve peak recovery within 6-12 months. However, some patients require 2-3 years to achieve peak recovery and quite a good number of them develop deformities due to improper care. The deformities at initial stages develop due to oedema in a paralysed limb, shortening of active unopposed muscles, fibrosis in paralysed muscles, failure to stretch paralysed muscles and posture gravity. That is at early stage, deformities remain limited to

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soft tissues which later become permanent with fibrosis and shortening of muscles and continued bony growth<sup>9,10</sup>. So, every effort should be made to prevent the occurrence of the deformities, by maintaining length by stretching soft tissue and passive movements of joints during acute stage, convalescent and recovery stages of the disease.

The object of this paper is to review the different factors leading to development of deformities in paralytic limbs and chalk out the planning for prevention of these deformities by conservative and/or surgical treatment based on common principles of management. The review in details of the results of management of all varieties of deformities is beyond the scope of this paper.

### PATIENTS AND MATERIAL

This ongoing prospective study of 650 patients with post polio paralysis and deformities was carried out by the department of Orthopaedic Surgery and Physical Medicine and Rehabilitation at JPMC, Karachi from April 1992 to December 1997. Patients with post polio paralysis were referred from health centres and by family physicians from all over Pakistan. Patients were thoroughly evaluated in "Polio Conference" of Orthopaedic Surgeons, Physiotherapists and Occupational Therapists, held twice a week by the said departments.

All the patients were evaluated by "Detailed Muscle Testing", physical examination, clinical Gait study and group discussion for decision making regarding management of these patients. The patients were categorized in three groups, Group I: who required continued physical therapy, electrical stimulation and rehabilitation (n=180), Group II: who required surgical correction of deformities and balancing procedures (n=470), Group III: who required training in braces/orthotics. This included both post operative (n=146) and non operative patients using braces (n=60). Braces used were 163 long leg braces with abdominal corset or pelvic belt and 43 short leg braces, AFOs. All the patients were re-evaluated after every 3 and 6 months for assessment of results and for requirements of further training and surgery; minimum followup period was 6 months and maximum 4 years. Thirty Three

patients (13 operated, 20 non-operated) were not available for followup of less than three months, and were, therefore, not included in evaluation of results. The evaluation was based on parameters of correction of deformities, appearance of limbs, acceptability, requirement of braces and complications categorised as good, fair and poor<sup>11,12</sup>. Only two patients were operated for limb lengthening, in all others, the limb shortenings were compensated with shoe raise.

### RESULT

410 patients were males and 240 females (Ratio 1.7:1). The youngest child was of one and a half years and the eldest of 26 years; average age was 11.38 years (Table-I). 632 (97%) children were under the age of five years at the time of disease onset; whereas, only 235 (37%) of them reported for orthopaedic and rehabilitation treatment. Only few of them had specialist or institutional treatment during active and recovery stage of disease. All other 415 (73%) patients, at the time of starting orthopaedic and rehabilitation treatment, were above 5 years of age, including 165 adolescents and adults (n=165 - 25%) (Table-II). 466 (71.69%) children were non-vaccinated or incompletely vaccinated for polio-myelitis; whereas, 184 (28.30%) were completely vaccinated at the time of disease (AFP) onset. 326 (50.15%) children were from Urban slums or Katchi abadies and remote rural areas. Majority of them were non-vaccinated or were incompletely vaccinated. 217 (33.38%) were Afghan refugees residing in camps when they acquired disease and were non-vaccinated (Table-III). 107 children (16.64%) were from Urban Pakki-abadies with all basic civic facilities and majority of them were completely vaccinated (Table III). 35 children had upper limb involvement. 20 of them had associated lower limb and trunk involvement whereas only 15 has isolated upper limb involvement. 635 (97.89%) had lower limb and trunk involvement (including 20 associated upper limb weakness) (Table IV). There was no special predilection to side of involvement. Isolated unilateral deformities were noticed in 15 hips, 60 knees, 105 feet and 5 shoulders. Bilateral isolated knee deformities were 10 and bilateral isolated affected feet were 15 whereas none of the patients had isolated bilateral hip deformities. All other deformities (n=1340) were asymmetrical combination of foot, knee and hip (Table V,

**TABLE I AGE AT ONSET OF DISEASE**

Age (yrs.)	No.	%
< 1	119	18.30
1-2	179	27.53
2-3	201	30.92
3-4	061	09.38
4-5	072	11.07
5-6	007	01.07
6-7	002	00.30
7-8	--	--
8-9	001	00.15
> 9	--	--

**TABLE II AGE DISTRIBUTION AT ONSET AND PRESENTATION**

Age (yrs.)	Onset		Presentation	
	No.	%	No.	%
0-5	632	97.23	235	36.15
5-10	18	2.76	125	19.23
10-15	--	--	125	19.23
15-20	--	--	115	17.69
> 20	--	--	50	7.69

**TABLE III DISTRIBUTION ACORDING TO CIVIC LOCALITIES**

Patients from	No.	%
Urban areas	107	16.46
Urban sslum/katchi abadies	220	33.89
Rural areas	106	16.30
Afghan refugees	217	33.38

**TABLE IV REGIONAL DISTRIBUTION-I**

Ditribution	No.
Lower limb involment	635
Upper limb involment associated with lower limb	20
Only upper limb involment.	15
Bilateral involment	250
Unilateral involment	400
Right sided	205
Left sided	195

**TABLE V REGIONAL DISTRIBUTION-II**

Region	isolated UD/W*	Multiple BD/W**	Total
Hip	15	350	36
Knee	60	460	520
Foot	105	510	615
Shoulder	05	15	20
Elbow+Hand	10	05	15

\*UD/W=unilateral deformities/weakness

\*\*BD/W=bilateral deformities/weakness

**TABLE VI PATTERN OF MULTIPLE LOWER LIMB DEFORMITIES/WEAKNESS\***

Pattern	No.
Bilateral isolated hips	00
Bilateral isolated knees	10
Bilateral isolated feet	15

One side	Other side	No.
Hip	Foot	05
Knee	Foot	10
Knee+foot	Knee+foot	20
Hip+knee	Either hip/knee	20
Hip+knee	Hip+knee	20
Hip+knee+foot	Knee+foot	30
Hip+knee+foot	Hip+knee	25
Hip+knee+foot	Either hip/knee/foot	50
Hip+knee+foot	Hip+knee+foot	45
Unilateral	Knee+foot	75
Unilateral	Hip+knee	10
Unilateral	Hip+knee+foot	135

VI). Almost all patients who had knee deformities also had associated hip deformities or were flail and vice versa. 85 children had flail uncontrolled hip, knee and foot. 24 had

flail deformities of either foot, knee or hip. 25 children had genu-recurvatum deformities with hamstring as well as quadricep weakness. 27 children had paralytic dislocation hip with fixed flexion contraction (FFC) hip and weak abductor - extensor group. Scoliosis and kyphoscoliosis were seen in 72 patients (Table VII). Almost all patients with unilateral deformities had limb length discrepancy.

**TABLE VII SPECIFIC PATTERN OF LOWER LIMB DEFORMITIES**

Region	No.	%
<b>Hip (n=367)</b>		
FFC	234	64.10
Flail	106	29.04
FFC+ abductor & extensor weakness with paralytic dislocation	27	7.84
<b>Knee (n=520)</b>		
FFC	390	75.00
Flail	105	20.19
Genu recurvatum	25	4.80
<b>Foot (n=615)</b>		
Equinus	62	10.08
Equinovarus	201	32.68
Calcaneus	48	7.80
Calcaneus valgus	65	10.50
Equino cavo varus	130	21.13
Flail	109	17.72
Scoliosis & kyphoscoliosis	72	11.07

470 (72.30%) patients were operated for correction of deformities, muscle balancing procedures and arthrodesis. 290 (61.70%) improved well with good results, were able to be ambulatory without use of braces and nearly normal postural alignment. 146 (31.06%) resulted fair, were independent to walk with braces (Table-VIII) and 21 (4.04%) resulted poor due to major complications which required another surgery. Two patients operated for correction scoliosis and stabilization with Harrington rod showed good results, 16 who were given spinal braces for kyphoscoliosis improved.180 patients continued on non-operative treatments (Physical therapy, electric stimulation, postural training and training in braces) (Table-VIII). They were either younger than 3 years of age or in the recovery phase of the disease. Some of them had severe

**TABLE VIII ORTHOSIS/BRACES USED 1992-1997**

	No.
Long leg unilateral braces	122
Long leg bilateral brace with pelvic belt or abdominal corset	141
Short leg braces	68
A. F. Orthosis braces	20
Splints for upper limbs	05
Lumbosacral corsets & spinal braces for scoliosis & kyphoscoliosis	16

trunk muscle paralysis, flail limbs and kyphoscoliosis. 60 (33.33%) of them improved and were able to use braces and became independent. 120 (66.66%) remained unchanged - could not improve and were not able to use braces (Fig. 1).



Figure 1 10 year aged girl walking with monkey gait, due to untreated multiple post polio deformities. Severe flexion contracture. Both hips and left knee, recurvatum deformity of right knee and calcaneus foot. These deformities could have been prevented by proper care for posture, positioning of limb and exercises at early stage of disease.

**DISCUSSION**

The polio myelitis infection has no special predilection for sex. However, in most of the literature, including our study, more of males are affected than females. In our study ratio (1.7:1) of males to females is nearly similar to Sharrard's 1.5:1<sup>11</sup>. Similarly, almost all workers have reported that in the majority, polio-myelitis affects age group of 6 months to 3 years (Table I & II) and is more prevalent in low socio-economic groups with poor hygienic and basic civic facilities and inadequate health education. The disease common among non-vaccinated or incompletely vaccinated children Table-III<sup>9-11,12</sup>.

Reported Wyatt that "in Africa, Middle East and Asia, Paralysis of lower limb was more common (85%, range 75-98%) than in USA and Europe (49%, range 35-71%) and the distribution of leg muscle affected in Algerian children was different from those of UK cases<sup>8</sup>. Similarly in our study, lower limbs were affected more (97%) than the upper limbs (3%) (Table IV & V). This common observation<sup>8-14</sup> of Residual Paralysis commonly affecting lower limbs more than upper limbs has been explained by Lovett's (1913) hypothesis (Ci-13) based on clinical grounds; that "Severity of paralysis is proportionate to weight to be met by the muscle at different level". Therefore, "a casual relation exists between difference in size and function of individual muscles and their frequency of affection by polio-myelitis". This aspect was further

studied by Sharrard<sup>13</sup> and Skinhoj (Ci-13) with statistical analysis of anatomical studies on spinal cord. Sharrard (13) observe that "Lumber two to lumber four spinal segments are more frequently affected"; that "a relationship exist between the distribution of the paralysis and the distribution of motor cells affected"; that, "Since upper lumbar spinal segment supply muscles in the region of the hip and thigh, while, lower lumber segment and sacral segments generally supply the muscles of leg and foot, it is easy to see why there is apparently a greater incidence of affection in proximal than distal muscles in the limb". However, Skinhoj (Ci-13) and Sharrard<sup>13</sup> both disagree with Lovett's (1913) Hypothesis and conclude that "there is no quality of the muscle; such as size, function, position in limb or phylogenetic development that can satisfactorily explain the frequent affection of some muscles and the high proportion of paralysis". But, it is the involvement of motor cell column and their length affected, which leads to frequency and severity of target muscle paralysis. The muscles supplied by short column of cells are most frequently paralysed than those supplied by long column of cells, for

**TABLE IX ASSOCIATED PARALYSIS IN THE LOWER LIMB (WJW SHARRARD, 1955)<sup>9</sup>**

Muscles in heavy type are very strongly associated, Those in normal type are strongly associated

Muscles	Associated muscles
Hip flexors (psoas)	Quadriceps, adductors
Adductors	Quadriceps, inner hamstrings, Hip flexors
Quadriceps	Hip flexors, adductors, inner hamstring
Inner hamstrings	Adductors, quadriceps, hip abductors
Hip abductors	Gluteus max., Biceps femoris, tensor fascialatae
Tensor fascialatae	Hip abductors, gluteus maximus
Gluteus maximus	Hip abductors, biceps, tensor fascia
Biceps femoris	Gluteus max., Hip abductors, calf muscles
Calf (triceps surae) muscles	Biceps femoris, flexor digitorum longus
Flexor hallucis largus	Flexor digitorum longus, extensor hallucis longus
Flexor digitorum largus	Flexor hallucis longus, extensor hallucis longus
Extensor hallucis largus	Extensor digitorum longus, peronei, flexor hallucis longus
Peronei	Ext. Digitorum longus, ext. Hallucis longus, tibialis posterior
Tibialis anterior	Tibialis posterior
Tibialis posterior	Tibialis anterior, extensor hallucis longus
Intrinsic foot muscles	Calf muscles, peronei

instance tibialis anterior, tibialis posterior and flexor digitorum and extensor digitorum muscles of toes are more frequently affected<sup>10,13,14,15</sup> (Table V, VI & VII). Another important commonly observed fact based on clinical findings is that certain muscle appear to be paralysed or weakened together, has been studied further by Sharrard<sup>13</sup> who named it as "Associated paralysis" (Table IX). He explains it as: "when whole of the columns that supplied a muscle has been destroyed, it is likely that one or more adjacent motor columns that occupy the same length of spinal cord will be completely destroyed or severely affected". This is reflected in clinical distribution of muscle paralysis; for instance: columns that supply extensor hallucis longus, extensor digitorum and peronei lie next to each other and occupy approximately same length of spinal cord. If one of these muscles is paralysed, it is frequently associated with paralysis of the other two; conversely, absence of paralysis in one muscle is likely to be associated with absence of paralysis in the other. When both of the associated muscles are paralysed, the prognosis is worse<sup>9,13</sup>. Regarding isolated muscle paralysis, Sharrard<sup>13</sup> concludes that "individual muscle is not paralysed unless the whole of its motor cell column are affected, even a residue of 10% of intact motor cell may permit substantial activity in that muscle". However, this substantial activity in muscle due to left over intact motor cell may exhaust with over stretching or over fatigue by resumption of full activity in aparalytic cases at too early a date (within 2-3 weeks). However, the flail lower limb results from extensive lesion that destroys the motor cells in lumbo sacral segments partly sparing sacral segments, leaving few intrinsic muscles of foot and peronea active<sup>11-13</sup>.

Vaccine associated polio-myelitis and provocation of polio-myelitis following intra-muscular injection during high grade fever observed by few workers<sup>7,11,12,16</sup> from India, Kashmir and Pakistan was also observed as a common fact in our study. However, onset of acute illness and duration of acute and convalescent stage of disease, was very short and less severe in vaccine associated paralytic polio cases. Most of these children had afebrile paralysis, common complaints being the paralysis noticed when patient got up in the morning or paralysis noticed after the short duration of fever for 24-48 hours. Similar was the observation of Cherry<sup>17</sup>, Pervaiz<sup>11</sup>, Sharrard<sup>10</sup> and Mustafa<sup>12</sup>. Kimpen<sup>8</sup> observed that, "vaccine associated poliomyelitis is the major drawback of OPV, a majority of poliomyelitis cases in USA are now vaccine associated". Nkowane<sup>18</sup> and Esteves<sup>19</sup> found frequency of vaccine associated polio-myelitis as less than 0.3 cases per million doses. Where as relative frequency associated with the first dose of OPV as one case per 520,000 doses and nearly 10% of vaccine associated Poliomyelitis cases are Immuno-deficient<sup>18-20</sup>. Though the immune response develop in case of all three strains of OPV vaccine, most of the vaccine associated poliomyelitis cases has been

due to type III and type I. It has been associated with isolation of neuro virulence mutant (revert) of type3/type I. The other possible cause may be the decreasing attenuation (that is antigenic drift) in vaccine strain resulting from amino acid substitution<sup>5,16,17,19,20,21,22</sup>.

The recovery is faster in younger than in adults and no difference has been found in the rate of recovery of muscles in lower and upper limbs. However, clinical difference in ability of individual muscle to recover depends upon the proportion of their number that remains permanently paralysed. The maximum recovery has been seen by the month, and with rare exceptions (10% individuals). Muscle recovery is complete after 24 months<sup>9</sup>. The deterioration in muscle is uncommon and, when it occurs, "is associated with the presence of strong opposing force of antagonist muscle or of gravity". This deterioration has also been seen years after initial onset of polio. Common complaints being fatigue, weakness, pain, decreased endurance and psychological problems. This has been named as "Post polio syndrome" or "late sequelae of poliomyelitis". This has been identified as unique clinical entity warranting the attention of health care community<sup>9,12,13, 22-24</sup>.

The asymmetrical and patchy distribution of paralysis<sup>11,12,14</sup> noticed at an interval after acute stage or in an afebrile paralysis (Table-VI); frequent involvement of hip abductors, quadriceps, tibialis anterior<sup>13</sup> Deltoids<sup>14</sup>; abolition of reflexes in paralytic area (in few cases it may re-appear after short interval); hypotonia, vasomotor disturbances, muscular atrophy, absence of pyramidal signs and absence of sensory disturbance<sup>14</sup>, are the typical diagnostic features of polio-myelitis. These are the features that differentiate it from other lower motor neuron disease; from Guillian Barre's Syndrome; from Peroneal muscular atrophy (at early stage, this affects intrinsic muscles of foot and peronei); from spina bifida (that is often associated with bilateral symmetrical pescavus, pes calcaneocaus or unilateral pescavus)<sup>13,14</sup>.

Precise knowledge of pathological lesion is very helpful in the diagnosis, planning of treatment and assessment of prognosis of paralytic poliomyelitis. However, the examination of patients must be described and assessed in terms of the muscles but not after spinal root or nerve. This is the basic principle of "muscle testing" used for clinical evaluation<sup>14</sup>. During early days, it may be difficult to arrive at a muscle estimate with any precision owing to the presence of pain. However, muscle testing after 6 weeks of disease onset can definitely predict recovery and assess the need for tendon transfer or other measures to prevent deformities. The accurate, detailed muscle testing, especially for detection of associated paralysis is also helpful for prediction for prognosis of paralytic poliomyelitis. The muscle testing technique is important part of the routine examination of paralytic polio cases, and perhaps more sensitive

and certainly more rapid and practical than neuro-muscular electrical (EMG) examination.

Throughout the acute illness and recovery, the rehabilitation plays an important role to prevent deformity and contractures. The techniques available are (a): Passive Stretching of soft tissues to prevent acute and postural contractures in a flail limb. This needs twice a day range of motion movement of joint. (b): Teaching correct posture in sitting, standing or walking. The child with flail lower limb who is allowed to lie all the day with hip abducted and flexed, will develop a flexion - abduction - external rotation contracture at hip and knee and varus - planter flexion deformity of foot. (c): Active exercise for weak muscles is an essential part of restoration of function in partly paralysed limb. This is of much more value once muscle imbalance has been redressed by surgical intervention. In this situation, active exercises are of invaluable help in maintaining muscle balance and in re-training a transplanted muscle/tendon transfer. The use of traction and splintages is of greater value in acute or postural contractures. Splints are used essentially during period between sessions of physical therapy but once the acute stage is over, continuation of rigid splintage is un-necessary and may be harmful by inhibiting muscle recovery. Unnecessary use of splintage is harmful when used in non flail limbs. The weight of splint is an additional load for the child to walk and pressure sore may develop if sensory loss is associated with motor weakness<sup>9,10,13</sup>. Therefore, splintage shall be used only as an aid in flail limbs and as an aid until surgical treatment is possible. The use of traction or serial plaster casts to correct established deformity also has considerable limitation due to complications of avascular necrosis, epiphyseal separation, damage to main vessels and injury to nerves. Better way shall be surgical intervention. The surgical treatment is indicated in paralytic deformity wherever conservative measures of physical therapy and splintage have failed or will inevitably fail when there is muscle imbalance and bony deformities.

Clinical decision making in management of patients with paralytic poliomyelitis constitutes a particular challenge because injudicious treatment may exacerbate the patients symptoms leading to further deterioration and loss of function. Detailed muscle testing and group discussion is needed for decision making and timing for surgical intervention to improve postural alignment, prescription of orthoses, weight control, prescription of walking aids and mobility aids.

The polio can be eradicated only through combined efforts of physician, public health workers and the people of Pakistan. With collective efforts, it will be the second disease after small pox to disappear from the globe. WHO Director General thinks that "The eradication of polio is within our grasp. We owe it to future generations not to let it slip away"<sup>13</sup>.

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# CONGENITAL DIAPHRAGMATIC HERNIA: NISHTAR HOSPITAL EXPERIENCE

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MUHAMMAD ASHRAF AND M. AFZAL SHEIKH

## ABSTRACT:

A three year study (1993-1995) was carried out on the Congenital Diaphragmatic Hernia (CDH) in infants in the Department of Paediatric Surgery at Nishtar Hospital Multan in order to document the clinical features, operative results and impact of early and late presentation on final outcome. Study included 13 consecutive cases with ages ranging from 12 hours to 9 months. Seven (53.84%) were neonates with predominant symptoms of respiratory distress since birth, cyanosis and apnoeic spells. In six (46.16%) the symptoms were recurrent respiratory tract infection, vomiting and failure to thrive. Physical signs included absence of breath sounds and presence of bowel sounds in 8 (61.53%), hyper-resonance of chest in 2 (15.38%), flat abdomen in 7 (53.84%) and cachexia in 1 (7.69%). One patient (7.69%) died pre-operatively and in one, parents refused surgery. Eleven cases were operated upon. Conventional mechanical ventilation (CMV) was given to all the 5 neonates (45.45%). Ten (91.01%) out of 11 survived.

**KEY WORDS:** Congenital Diaphragmatic Hernia, Infants, Ventilation.

## INTRODUCTION

CDH is a common surgical cause of severe respiratory distress in newborn. Infants born with CDH have a high mortality rate due to respiratory failure caused by pulmonary hypoplasia and persistent pulmonary hypertension<sup>1,3</sup>. Delayed surgery, respiratory support and extracorporeal membrane oxygenation in selected cases have improved survival in such cases<sup>4,5</sup>. In Pakistan, patients of CDH who are critically ill or develop respiratory distress within 6 hours (high risk cases) rarely reach specialized center. We receive those patients who have either survived the initial respiratory distress or develop the symptoms later on. This factor and the help of conventional mechanical ventilation have markedly improved the post-operative survival of our patients. In this study we report our experience of these cases.

## PATIENTS AND METHOD

From January 1993 to December 1995, a study was conducted in the Department of Paediatric Surgery, Nishtar Hospital, Multan on thirteen patients with CDH. All the patients were admitted through emergency. Diagnosis was made on the basis of history and clinical examination supported by investigations which included CBC, serum electrolytes and X-ray chest with abdomen. Barium meal was done in 4 cases. One of the neonates died before any treatment could be offered and in another case parents

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refused surgical treatment. Eleven patients (5 neonates and 6 infants) underwent surgery. All except one had left sided CDH. A subcostal incision was made in all cases. Primary repair of diaphragm was performed. A chest tube was placed and connected with under water seal before the closure of diaphragm. Post operative care included continuous use of muscle relaxants, sedatives and conventional mechanical ventilation in all neonates.

## RESULTS

The study included 13 patients with the age ranging from 12 hours to 9 months. There were 9 males and 5 female patients. Two (15.38%) presented in first 24 hours, six (46.15%) between 1 to 9 months of age (Table I).

Eight patients were referred by paediatricians, two neonates who presented in the first 24 hours were referred by obstetrician and general practitioner. Seven (53.84%) patients had respiratory distress since birth. Cyanosis was present in 6, vomiting in 5, repeated attacks

**TABLE I** AGE AT PRESENTATION

Age Range	No.
< 1 day	02
1-7 days	03
7-28 days	02
1-6 months	03
6-9 months	03
Total	13

of respiratory infection in 5 and failure to thrive in 2 patients. On physical examination, respiratory rate was between 50-100/min in 7 and between 30-50/min in 6. Movements of left side of chest were decreased in 11 cases. Bowel sounds were audible in chest in 8 patients. Out of 11 cases recurrence of hernia occurred in 1 (9.09%) which was reoperated, wound dehiscence in 2 (18.18%), gastric atony resulting in abdominal distention was observed in 2 (18.18%) which settled down without intervention. One (9.09%) patient died, this was the case in which recurrence occurred. The patient went into cardiac arrest while being reoperated and could not be revived.

### DISCUSSION

CDH is a challenging emergency both for the paediatrician and paediatric surgeon, especially when severe respiratory distress develops within 6 hours of birth. Introduction of CMV, ECMO and pharmacological agents along with delayed repair of hernia have markedly influenced the outcome of high risk cases<sup>6</sup>. In general, later the onset of symptoms, better the prognosis. Postoperative survival figures close to 100% have been recorded for infants who were not brought for operation until after the first 24-48 hours<sup>9</sup>.

In our study symptomatology of 7 cases presenting in the neonatal period is similar to that reported in literature i.e. respiratory distress since birth<sup>7,8</sup>. Recurrent respiratory tract infection, vomiting and weight loss are a common feature in these cases<sup>10</sup>. Major complication requiring secondary surgery was recurrence of hernia in one case. As all our cases presented after the first 12 hours of life, ten (90.1%) out of 11 cases survived after surgery<sup>10</sup>. Water et al reported a postoperative survival of 92% in their study

of 13 patients who were beyond neonatal period, which is similar to our study<sup>7</sup>.

Best possible operative results were obtained with the help of limited existing facilities. It was also observed that patients who develop symptoms late or survive the initial distress with or without assisted ventilation, have good prognosis.

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# CONGENITAL DIAPHRAGMATIC HERNIA & EVENTRATION OF DIAPHRAGM

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## ABSTRACT:

*Congenital diaphragmatic hernia (CDH) is a condition on which lot of research has been performed and new facts related to this condition are published but still it carries high mortality especially in those patients who are symptomatic at birth. Similarly eventration of diaphragm has spectrum of clinical presentation. There is hardly any data on these condition from our country. In this article we are presenting our record of this condition. In one year period (December 1996 to November 1997), seven patients presented with CDH. All were on left side and Bochdalek type. There were six male and one female patient. In only one patient respiratory distress developed in immediate newborn period. He presented to ER at the age of 3 days and died within 3 hours. Five patients presented in neonatal period and one at the age of 5 months. Associated anomalies were found in 3 patients. Six patients on whom surgery was performed, survived.*

*Four patients presented with eventration of diaphragm (ED). There were two male and two female patients. In 3 cases it was on right and in 1 on left side. Two patients presented with severe respiratory distress in newborn period. One presented at the age of 9 months and other at 2 years of age. Associated anomalies were present in 2 cases. There was no mortality in this group.*

*The small number of patients in this study probably does not reflect true incidence of this condition. Many babies may be dying at home or at peripheral hospitals before they could be transferred to tertiary care centres. This highlights the importance of creating awareness about these conditions among doctors dealing with neonates. It is hoped that other paediatric surgeons will document their experience of these conditions so that future projection of such anomalies from our part of world could be made.*

**KEY WORDS:** *Diaphragmatic Hernia, Eventration of Diaphragm, Respiratory Distress*

## INTRODUCTION

Congenital diaphragmatic hernia and eventration of diaphragm are common surgical causes of respiratory distress in newborns. CDH accounts 8% of all congenital anomalies. In Western hemisphere it is reported to occur in 1 in 4000 - 5000 live births and if still births are also included the incidence is as high as 1 in 2000<sup>1</sup>. About 24% - 33% of these have other associated anomalies<sup>2</sup>. Many advancements have been made in diagnosis and treatment but still it carries almost 50% mortality in those cases who are symptomatic at birth<sup>3</sup>.

Eventration of diaphragm is divided into congenital (non paralytic) and acquired (paralytic) groups. The symptoms and signs in both groups varies but they usually present with dyspnoea, recurrent pneumonia and vomiting<sup>4,5</sup>. Symptoms are due to defective ventilation<sup>6</sup>. Surgery, in the form of pli-

cation is required to restore the volume of thoracic cavity so that respiratory mechanism can work effectively<sup>7</sup>.

There is hardly any data available on these conditions from our country. In this study we are presenting our experience of these conditions to know their impact on our surgical service.

## PATIENTS AND METHODS

The patient with CDH who were brought with respiratory distress in neonatal period were initially resuscitated and when found fit for anesthesia, subjected to surgery. All patients were explored through left sub-costal incision. Following reduction of viscera diaphragmatic defect was closed in two layers with silk sutures. Chest tube was placed in all patients and removed when full expansion of lung occurred.

The indications for diaphragmatic plication in cases with ED were recurrent attacks of pneumonia and dyspnoea.

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**TABLE I** CONGENITAL DIAPHRAGMATIC HERNIA

Sex	Weight (Kg)	Place of Delivery	Age at Presentation	Age at onset of symptoms	Side	Associated anomalies	Management	Out come
Female	1.9	Hospital	72 hr.	At birth	Left	—	Ventilator	Died
Male	2.5	Hospital	7 days	3 days	Left	Malrotation & liver in chest	Operated	Alive
Male	2.0	Home	8 days	2 days	Left	—	Operated	Alive
Male	3.0	Hospital LSCS	8 days	2 days	Right	Situs inversus, malrotation and (#Humerus)	Operated	Alive
Male	3.0	Hospital	1 Month	3 week	Left	Arthrogryposis	Operated	Alive
Male	—	Hospital	5 Months	1 week	Left	—	Operated	Alive
Male	3.9	Home	5 Months	3 days	Left	—	Operated	

All patients were put on intravenous antibiotic and supportive treatment. Once fit for surgery all underwent thoracotomy. The diaphragm was tented up with forceps and plicated with non-absorbable (silk) sutures placed in rows. Chest tube were placed in all patients. Following discharge patients were followed in OPD.

## RESULT

This study is of one year duration (from December 1996 to November 1997) and included seven patients with CDH and four with ED. Three patients of CDH and two of ED were admitted through emergency and rest of them had elective admission.

Seven patients were brought with left sided Bochdalek type of CDH. There was strong male preponderance (M:F:6:1). One patient developed respiratory distress in immediate newborn period. He presented to ER at the age of 3 days and died within 3 hours. Five patients presented in neonatal period and one at the age of 5 months with respiratory distress following respiratory infection and failure to thrive. Associated anomalies were found in 3 patients. In six patients diaphragmatic defect was repaired after improvement in general condition. No sac was found in any case. Only one patient required elective ventilation in post operative period for 48 hours. In this patient layered closure of abdomen was not possible and ventral hernia was

made. All patients survived following surgery (Table I).

Four patients presented with congenital type of ED. Male to female ratio was 1 : 1. The defect was in right hemidiaphragm in 3 cases and in one patient who also had situs inversus, defect was found on left side. Two patients presented with severe respiratory distress in newborn period just like that of CDH. One presented at the age of 9 months and other at 2 years of age with respiratory tract infection and failure to thrive. Associated anomalies were present in 2 cases. All of them were operated. There was no mortality in this group (Table II).

## DISCUSSION

Congenital diaphragmatic hernia has received great attention over the last two decades and many advances have been made in its management which now include ventilatory support, high frequency oscillation, inotropic drugs, surfactant and nitric oxide<sup>8</sup>. The other innovation in the field of management is ECMO. Great enthusiasm was shown initially but mortality for the subset of patients who were symptomatic within six hours of birth remained the same<sup>9</sup>. The high mortality is due to pulmonary hypoplasia<sup>10</sup>. In utero correction of the defect is also performed at few research institutes<sup>11</sup>.

Our experience of this condition is entirely opposite. In one year period only seven patients were managed and

**TABLE II** EVENTRATION OF DIAPHRAGM

Sex	Weight (Kg)	Place of Delivery	Age at Presentation	Age at onset of symptoms	Side	Associated anomalies	Management	Out come
Female	2.2	Hospital	4 hr	At birth	Right	—	Operated	Alive
Male	2.9	Hospital	24 hr	At birth	Right	Bil. TEV, Chest deformity	Operated	Alive
Female	6.0	Hospital	9 Months	Neonatal age	Right	Cong. Cataract, Cerebral Palsy	Operated	Alive
Male	11.0	Hospital	2 Yr	Neonatal age	Right	—	Operated	Alive

even these belonged to that group in whom excellent survival is reported in literature. What could be the cause of such variation is a matter of speculation. As there is no comprehensive health care system in our country exact incidence can not be worked out. Similarly ante-natal ultrasound is not performed routinely and those who are doing it are not experienced in diagnosing this condition. In addition many of the deliveries are not supervised by medical personnel and even those that are conducted under supervision, failure to recognize this condition is high. As this subset of newborns have high mortality rate, this may be the reason why we are not receiving these cases.

Eventration of diaphragm may remain asymptomatic or may present with severe respiratory distress just like CDH in newborn period. Symptomatic patients may develop life threatening distress following respiratory infection. The variable presentation makes it difficult to chalk-out absolute indications for operation. Although conservative treatment is reported by especially with paralytic variety but such treatment is prolonged and has variable results. Some authors recommend operation liberally to decrease morbidity associated with conservative treatment<sup>12</sup>.

The long term results of diaphragmatic plication are quite favourable<sup>13</sup>. The pulmonary function tests, thickness of diaphragm and fluoroscopic results of diaphragmatic movements were satisfactory. This probably results from approximation of weak peripheral muscle layer of diaphragm thus creating stronger muscle centre<sup>14</sup>. Our result of diaphragmatic eventration support the observation made by other contributors.

At the end of study it is our observation that CDH on which lot of funds have been allocated in western world is probably not a problem of our country as such. This observation is premature in a sense that we do not have actual data of this problem at present. It is our suggestion that all units dealing with paediatric patients should make it mandatory to get an opinion from paediatric surgeon on all patients who present in newborn period with respiratory distress and cyanosis. Post mortem of all early post natal deaths and stillborn can go a step forward in detecting these subjects. It is also important to pursue all obstetricians to get an ultrasound not only to rule out obstetrical problem but also of fetus as well. In this regard sonol-

ogists can help a lot. They can detect many congenital anomalies for which appropriate steps can be taken at delivery. Going through this exercise would help in compiling actual data, only then future projections could be made. At present this study of short duration shows good results in a small number of patients.

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# DIAGNOSTIC VALUE OF RENAL BIOPSY IN ACUTE RENAL FAILURE

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## ABSTRACT:

One hundred cases of acute renal failure (ARF) were studied prospectively from January- 95 December-96, at Jinnah Postgraduate Medical Centre, through random selection from the indoor and outdoor patients. Age ranged between 14 to 75 years with a mean of 35 years. Renal biopsy was performed in 42 cases while successful renal biopsy sample was obtained in 40 patients (40%) having intrinsic ARF. Obstructive uropathy and pre-renal ARF cases were excluded, except 05 cases of pregnancy related ARF in which despite the dialysis support renal functions deteriorated and did not return to normal even after 4 weeks.

Histological diagnosis revealed that majority of the cases were rapidly progressive glomerulonephritis (RPGN) 10 (25%) acute cortical necrosis 05 (12.5%), renal infarction 04 (10%), acute endocapillary proliferative glomerulonephritis 04 (10%), interstitial nephritis 03 (7%), membranous nephropathy 02 (5%), and acute tubular necrosis 02 (5%). Nevertheless, our clinical diagnosis coincided with biopsy findings in 10 (24%) cases. However the histological diagnosis changed the clinical diagnosis in 30 (75%) patients leading to change in treatment approach. We conclude that renal biopsy is a useful investigative tool where clear clinical history is not available, the clinical diagnosis is doubtful or the normal course of ARF is not followed.

## KEY WORDS:

## INTRODUCTION

Acute renal failure is a clinical syndrome associated with a significantly high morbidity and mortality. Therefore a rapid and accurate diagnosis is a must. Renal Biopsy is a very useful investigative tool for establishing the diagnosis, where clinical evidence is insufficient as it yields important clues. Furthermore, clinical diagnosis needs to be confirmed also by renal biopsy. Percutaneous renal biopsy has been used in clinical practice for approximately thirty years and its use has contributed significantly to the understanding of renal parenchymal diseases<sup>1,2</sup>. Percutaneous renal biopsy is often necessary to establish a histological diagnosis to guide therapy and to allow for prognostication in renal parenchymal disease. Acute renal failure may be brought about by primary disease in any of the four histologic components of the kidney: glomeruli, tubules, interstitium or vessels. Biopsies performed in the setting of acute dysfunction are becoming much more quantitative; therapy oriented, pathogenesis based and standardized<sup>3</sup>.

The purpose of the study was to find out the histological diagnosis in the cases of ARF which did not follow the typ-

ical course, to correlate aetiology of ARF with histological findings and to confirm clinical diagnosis in unexplained renal failure with normal size kidneys.

## PATIENTS AND MATERIAL

This study was conducted in the Department of Nephrology, JPMC, Karachi from January-95 December-1996. One hundred consecutive cases of ARF were selected and worked up for renal biopsy indications particularly in cases of acute proliferative glomerulonephritis and RPGN, Pre-renal ARF without urine out put even after 4 weeks treatment and to evaluate the prognosis of disease.

All patients were thoroughly investigated prior to the procedure regarding hypertension, liver function tests, bleeding time, clotting time, packed cell volume, platelet, blood urea nitrogen, serum creatinine and HBsAg. If any abnormality was found biopsy was either postponed or cancelled. All the 42 cases were selected for biopsy and biopsies were performed under real time ultrasound guidance using 18 gauge Bard Monpty automated biopsy gun. The procedure itself was as follows: With the patient in prone position inferior pole of the left kidney was localised and a spot for the approach was marked on the skin and a depth measurement was taken. The skin was sterilised, 2% lignocaine

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local anaesthetic was infiltrated into the subcutaneous tissue at the entry site and along the path to the inferior pole of the left kidney. The biopsy needle was inserted free hand and the path was followed until it reached the surface of the inferior pole, the patient was then asked to stop respiration while the biopsy instrument was discharged. The renal tissues obtained were preserved in 10% formalin solution, and sent for pathological examination immediately. Urine analysis and renal ultrasound was performed 24 hours after biopsy to evaluate complications such as haematuria and perirenal haematoma.

## RESULTS

One hundred cases of ARF were included in the study prospectively and after thorough investigations and excluding the obstructive causes only 42 patients having intrinsic ARF were selected for percutaneous renal biopsy. In two patients, the specimens were muscle and material insufficient for histological diagnosis. In 40 patients we obtained adequate tissue for diagnosis with an average of  $19 \pm 5$  glomeruli in each patient. In 10 (25%) patients the biopsy specimen showed RPGN. The pathological diagnosis in other thirty patients are given in Table-I.

No death resulted from percutaneous renal biopsy in our patients. The only morbidity following biopsy was haematuria. However no blood transfusion or surgical intervention was required and it terminated itself by simple diuresis. No post-biopsy complications like peri-renal abscess, haematoma, septicaemia, urinary tract obstruction or perforation of hollow viscera were observed.

The effect of renal biopsy findings on the accuracy of pre-biopsy diagnosis are depicted in table-I. Our clinical diagnosis coincided with biopsy findings in 25% of cases only. However, the histological diagnosis changed the clinical diagnosis in 75% of cases which led to changes in the therapeutic approach and treatment modalities.

**TABLE I** EFFECT OF RENAL BIOPSY FINDINGS ON DIAGNOSTIC ACCURACY

Clinical Diagnosis	Histological Diagnosis
Pre-renal	
Post-partum haemorrhage - 7% (failed to open within four week)	Acute cortical necrosis
Post-partum haemorrhage - 5%	Renal infarction
Intrinsic Renal Disease	
Acute nephritis - 25%	Rapid progressive glomerulonephritis
Thrombotic thrombocytopenic purpura - 2.5%	Multiple infarction
Acute nephritis - 10%	Endocapillary proliferative glomerulonephritis
Acute nephritis - 7%	Interstitial nephropathy
Acute renal failure (hypovolemia) - 5%	Membranous nephropathy

## DISCUSSION

In more than 50% of our cases who underwent percutaneous renal biopsy our suspicion was acute tubular necrosis. But histologically they turned out to be having primary glomerular, interstitial or vascular cause leading to acute renal failure<sup>4</sup>. Our results are similar to the general experience reported in the literature. In this study 25% of the cases who clinically presented as acute nephritis turned out to be RPGN on biopsy and 5% of patients diagnosed as acute renal failure due to hypovolaemia turned out to be membranous nephropathy. Normally acute renal failure/hypovolaemia show changes compatible with acute tubular necrosis on histology and has a good prognosis. In the category of pre-renal acute renal failure, 12.5% of patients who were referred from the department of Obstetrics and Gynaecology, their biopsy showed acute cortical necrosis and their treatment modality had to be changed. Acute tubular necrosis is a common histological finding in cases of acute renal failure due to pre-renal causes. The underlying cause of acute renal failure was PPH and the clinical history revealed that in all the cases the mean arterial pressure had dropped below 40 mmHg and remained low for hours which resulted in irreversible renal damage. In case of rapidly progressive glomerulonephritis, 8 out of 10 patients who were early treated on clinical grounds responded well and the diagnosis was later confirmed by histopathology. Two patients did not improve, one of them probably due to delay in establishing diagnosis by renal biopsy, which could have been done earlier in hospitals from where the patients were referred. Our results are in general agreement with previous retrospective<sup>5</sup>, or prospective studies addressing the same issues<sup>6,7</sup>.

Fortunately we did not have any serious complications. Microscopic haematuria persisted in 5% of cases for 1-2 days. One review of 323 ultrasound guided biopsy procedures found no deaths or loss of kidney<sup>8</sup>. A report from Italy of 596 kidney biopsies performed under ultrasound guidance using 14 gauge trucut needle also showed absence of severe complications<sup>9</sup>. It seems logical that increased knowledge about disease pathogenesis and morphologic functional correlations would lead to broader indications for use of renal biopsy. In acute renal failure it should be possible to expand upon the diagnosis and prognostic information with renal biopsy.

It is concluded that although this is a very small study nevertheless the findings in this study suggest that renal biopsy frequently has an important impact on diagnosis, prediction of prognosis and therapy in renal diseases. As the procedure has negligible complication rate one should not hesitate to perform it early when indicated.

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# RUPTURE OF UTERUS: AN EXPERIENCE AT SANDEMAN CIVIL HOSPITAL QUETTA

TASNEEM ASHRAF

## ABSTRACT:

Sixty-five patients of uterine rupture were managed during two years period from 1st June 1995 to 30th May 1997 at Sandeman Civil Hospital Quetta. During the same period 10321 deliveries were conducted making an incidence of rupture of uterus 1 in 158 (0.63 %) deliveries. Sixty-one patients were non-booked and referred from distant areas of Baluchistan. The highest incidence was seen among grand-multiparas (71 %) and the commonest cause was obstructed labor in 44.61% cases. Rupture of previously scarred uterus occurred in 9 (13.84%) cases. Other common aetiological factors were fetal malpresentation, grandmultiparity and injudicious use of oxytocin. Hysterectomy was performed in 46 (70.76%) patients while repair was done in low parity patients with linear, clean, lower segment ruptures. Antenatal check up facilities and proper training of midwives, reducing parity and increase funding by Government for safe home and hospital delivery can prevent this obstetric tragedy.

**KEY WORDS:** Uterine rupture, Morbidity, Mortality

## INTRODUCTION

Rupture of pregnant uterus is one of the dreaded obstetric complications which is associated with high foeto-maternal morbidity and mortality. Most of the cases occur during late pregnancy and labor. The incidence in early pregnancy is very low and few cases have been reported in previously scarred uterus. In the developed countries where the level of obstetric care is excellent, rupture of uterus is a rare event. The same cannot unfortunately be said for the developing countries like Pakistan where poverty, ignorance, illiteracy, aversion from abdominal delivery, traditional practices and grand multiparity make this serious complication a common occurrence. Varying incidences have been reported from different countries. It includes 1:416 deliveries from Nigeria<sup>1</sup>, 1:2500 from Ireland<sup>2</sup>, 1:1500 from United states<sup>3</sup>, 1:284 for Zaire<sup>4</sup>, 1:189 at Jinnah Postgraduate Medical Centre Karachi<sup>5</sup>.

The purpose of study was

1. To find out the number of cases of rupture uterus managed at Sandeman Civil Hospital, Quetta.
2. To evaluate the risk factors associated with uterine rupture during pregnancy and labor.
3. To report maternal and fetal outcome.
4. To compare results with other studies.

## PATIENTS AND METHODS

This study was carried out in the Gynaecology &

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Obstetrics department of Sandeman Civil Hospital Quetta. This hospital is affiliated with Bolan Medical College, Quetta and caters to patients from all over Baluchistan as well as from border areas of Afghanistan. This is a two years retrospective study. All cases with complete or partial separation of walls of uterus, with or without expulsion of the fetus inside the peritoneal cavity, were included. Cases of a symptomatic scar dehiscence were excluded.

Data for this study was obtained from case files of patients, admission register, labor room and operation theatre records. Data was reviewed regarding patients' age, parity, booking status, history of present pregnancy, labour medication, abdominal and vaginal examination, maternal and fetal outcome, type of surgical procedure done, pre and post operative complications.

## RESULTS

Sixty-five patients of uterine rupture were managed during two years period from 1st June 1995 to 30th May 1997. Total number of deliveries for the same period were 10321. Cases of uterine rupture were 1 in 158 (0.63%) deliveries. Rupture of previous cesarean section scar was seen in only 9 (13.84%) cases. Rupture of uterus was complete in 59 (90.76%) cases and partial in six (9.24%). Most of these patients were admitted through emergency room. Sixty one (39.84%) patients were non-booked and were referred from urban and rural areas of Baluchistan and Afghanistan. Only four (6.15%) patients had rupture uterus at Civil Hospital, Quetta. Out of these, two had

uterine rupture due to obstructed labor while other two patients developed previous scar dehiscence.

Sixty-one (93.84%) patients were brought from different areas of Baluchistan and Afghanistan, either referred by doctor, LHV or brought by relatives themselves after a failed attempt at home delivery. Five cases were brought quite late following rupture of uterus due to non availability of transport. The common mode of presentation of the patients with uterine rupture was abdominal pain, loss of fetal movements, absent uterine contraction, abdominal tenderness, vaginal bleeding with or without shock.

Incidence of rupture uterus was found to increase with age and parity. Maximum incidence was seen among females of 30 to 40 years of age (Table I). Table II shows relation of parity with scarred and unscarred uterus. In the scarred group 7 (10.76%) patients were para five and above while in unscarred group 39 (60%) patients were grandmultiparas.

Parity	No.	Age (yrs.)	Mean age	%
Primigravida	3.0	18-24	21 ± 3	4.61
1-4	16.0	24-34	28.7 ± 6	24.61
5-7	25.0	30-40	37.5 ± 5	38.46
8-12	21.0	38-48	41.8 ± 7	32.30
Mean Parity	6.7	Mean age	34 years	--

The most common cause of uterine rupture was obstructed labor due to cephalopelvic disproportion seen in 29 (44.61%) cases. Second most common cause was fetal malpresentation in 12 (18.46%) cases. Twelve patients remained in labor for more than 30 hours. Nine (13.84%) developed previous scar dehiscence. In 6 (9.23%) patients there was history of oxytocin injection given by the dais at home followed by continuous abdominal pain. In this series there was not a single case of traumatic uterine rupture (Table III).

Parity	Scarred uterus		Unscarred uterus	
	No.	%	No.	%
Primigravida	--	--	03	4.61
1-4	02	3.07%	14	21.5
5-7	04	6.15%	21	32.30
8-12	03	4.61%	18	27.69

Laparotomy was performed in all cases. There was rupture of lower uterine segment in 44 (67.69%) cases. In 12 (18.46%) cases rupture was extending in whole of the anterior uterine wall, while in four (6.15%) cases anterior as well as posterior uterine walls were ruptured. In other

Causes	No.	%
Obstructed Labour	29	44.61
Mal Presentation	12	18.46
Previous Scar rupture	09	13.84
Grand Multiparity	03	4.61
Injudicious Use of Oxytocin	06	9.20
Major Fetal abnormality	02	3.07
Traumatic	-	-
Prolonged Labour	12	18.46

five (7.69%) cases uterine rupture was associated with rupture of urinary bladder.

Regarding surgical management, repair of uterus was performed in 19 (29.23%) cases having low parity and clean lower segment tears. In 13 (20%) patients tubal ligation was done along with repair. Hysterectomy was required in 46 (70.76%) patients having large tears extending into upper segment, vagina, bladder or having infected ragged edges. Complications associated with uterine rupture are shown in Table IV.

Complications	No.	%
Associated Injury to	-	-
Bladder	05	7.69
Vagina	03	4.61
Ureter	Nil	-
Wound Infection	11	16.92
Genital Sepsis	06	9.23
Wound Dehiscence	03	4.61
Vesicovaginal Fistula	04	6.15
Renal Failure	03	4.61

There were 61 (93.84%) fetal deaths. Only four (6.1%) babies could be saved. These 4 mothers had uterine rupture at Civil Hospital Quetta. 52 (63.07) babies were fresh still born while 4 (6.15%) had immediate neonatal death. Nine mothers died of rupture uterus. The cause of death was hypovolaemic shock in five patients, two patients developed disseminated intra vascular coagulation and the other two patients died of septicaemia.

## DISCUSSION

Rupture of the gravid uterus is an unexpected and devastating complication of pregnancy. The maternal and perinatal morbidity and mortality associated with this complication continues to pose a serious threat to the pregnant woman and her fetus. In spite of significant advances in Obstetrics, Surgery, Anaesthesia and increase in number of Obstetricians, the frequency of uterine rupture has not decreased significantly in the developing world. Possible explanation for this high incidence of uterine rupture includes illiteracy, lack of antenatal care and screening for

high risk pregnancies, unsupervised labor conducted at poorly equipped centers, poor referral system and lack of transport for immediate shifting of patients. Patients are only referred to the tertiary center when vaginal delivery becomes impossible and possibly after uterine rupture has occurred.

The incidences of rupture uterus is a reflection of the level of health care delivery services available in a community as well as utilization of these facilities. Its incidences is quite high in developing countries like Pakistan. When compared with those from various parts of the world, it is one of the highest, 0.42% in Jordan<sup>6</sup>, 0.07% in United States<sup>7</sup>, 0.1% in Germany and 1.08% in Nigeria<sup>9</sup>.

In this study 93.84% patients were non-booked, similar findings were observed by Rahman in Libya who says that 95% of his cases rupture uterus lacked prenatal care<sup>10</sup>. Multiparity is generally recognized as an important factor in the etiology of rupture uterus. In this study 46 (70.76%) patients were para 5 or above, similar finding have been reported by Golan<sup>11</sup> and Konje<sup>12</sup>. In patients with unscarred uterus the peak incidence was at parity 5-7, this is consistent with Schrinisky and Benson's<sup>13</sup>.

Obstructed labor was the commonest etiological factor identified from the study, other causes were abnormal fetal presentation and poorly supervised labor in previously scarred uterus. This study indicates that ratio of rupture in scarred to unscarred was 1:62, this fact is contrary to that reported by Aslam<sup>14</sup> but similar to Khan<sup>15</sup> and Nagarkatti<sup>16</sup>. The high risk patients would had been identified if they have received antenatal care and labored in a properly equipped hospital by trained persons. In this series six patients developed rupture as a result of oxytocin misuse by dais. Most of the cases in this study were diagnosed during labor by history, examination and clinical judgment. Four cases were diagnosed at laparotomy done for abruptio placenta or obstructed labor. Two cases were diagnosed after vaginal delivery at exploration of the lower uterine segment. Once uterine rupture is diagnosed, immediate resuscitation and laparotomy is mandatory<sup>3,17</sup>; delay in diagnosis or treatment worsens the morbidity and increases mortality<sup>18</sup>. Complete rupture occurred in 90% of cases and lower segment was the commonest site of rupture, this finding is similar to observations in many other series<sup>18,19</sup>.

In general, the surgical procedure performed for rupture uterus depends on the patients stability, location and extent of rupture. The best accepted form of treatment in this series was total hysterectomy done in 43 (66.15%) patients. Repair alone was offered to young women with low parity having linear rupture in the lower segment and who had no evidence of infection. Hysterectomy was preferred to repair in multi parous women with extensive,

bruised or contaminated tear to avoid post operative complication. Others<sup>1,20-22</sup> have used similar approach.

Damage to the bladder was the commonest associated injury. The incidence of 7.69% is similar to that of Golan<sup>11</sup> and Kassim<sup>23</sup>. The perinatal mortality in this series was 93.84%, it is similar to that reported by Agboola<sup>1</sup> and Mokgokong<sup>24</sup>. Only Schrinisky and Benson<sup>13</sup> achieved markedly lower perinatal mortality of 36%. As there were nine maternal deaths this study confirmed that fetomaternal morbidity and mortality due to rupture uterus is still very high. It is compatible with several other studies<sup>25,26</sup>.

## CONCLUSION

Rupture of pregnant uterus is an obstetrical tragedy. It is commonly seen in developing countries, associated with high fetomaternal mortality and morbidity. In order to reduce the high incidence of rupture uterus we have to create awareness among public about the importance of antenatal care. Screening of high risk groups, and motivation to utilize available health services. Improved obstetric care, vigilance in the technique of delivery, better funding by Government for safe home or hospital delivery may improve this health scene. Maternal and fetal mortality rates can be reduced to a considerable level by early referral, availability of transport, timely diagnosis and prompt surgery. Available of blood for transfusion and experience of the surgeon also influence survival rates.

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# EVALUATION OF LICHTENSTEIN HERNIA REPAIR FOR MORBIDITY AND RECURRENCE

FAISAL G. BHOPAL, GHULAM HASNAIN KHAN NIAZI, AND MUHAMMAD IQBAL

## ABSTRACT:

A study of 108 patients of inguinal hernia was carried out. In all 110 herniae were repaired under local anaesthesia, two patients had bilateral repair. All patients were subjected to Lichtenstein repair except type I (Gilbert Classification), obstructed and strangulated hernias. Local anaesthesia, 0.5% lignocaine with adrenaline was used. The results showed significant reduction in hospital stay (mean stay 1.3 days). Post operative complications were minimal and include scrotal haematoma (7.2%), wound infection (2.7%), post operative pain (5.5%). No recurrence was seen in 2 years follow-up. We strongly recommend Lichtenstein repair for inguinal hernia.

**KEY WORDS:** *Inguinal Hernia, Lichtenstein Repair, Local Anaesthesia*

## INTRODUCTION

From a review of literature on hernia for the past 100 years, it becomes clear that something is amiss as there have been hundreds of techniques described for the cure of this anatomical defect. Most of the procedures are only minor variations of few basic principles. So there are conflicting views, as to the best way to repair a hernia<sup>1</sup>. In this study we describe our experience of Lichtenstein repair.

## PATIENTS & METHODS

This study was carried out at Surgical Unit-I, Rawalpindi General Hospital, Rawalpindi on patients operated during June 1994 to October 1995. All patients with inguinal hernia admitted during this period were subjected to Lichtenstein repair except type I (Gilbert Classification)<sup>2</sup>, obstructed and strangulated hernias, which were excluded from the series. All these patients were evaluated by history, clinical examination and necessary investigations, before surgery as out door patients. The patients were followed up to 2 years post operatively. 108 patients were included in the study. In all 110 inguinal hernia repairs were carried out, two patients had bilateral repair.

All repairs were performed under local anaesthesia. Approximately 70 ml local anaesthesia (0.5 % lignocaine with adrenaline) was used. The object was to block iliohypogastric, ilioinguinal and genitofemoral nerves, together with cutaneous fibres of opposite side. All patients were operated in supine position. An incision was made 1.5 cms above and parallel to inguinal ligament, extending from deep inguinal ring to pubic tubercle curving caudally

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down over the pubic tubercle. Subcutaneous tissue / fat, external oblique aponeurosis were divided along the skin incision, haemostasis was secured. The hernia sac dissected/separated from cord. Indirect sac was transfixed at the neck and excised while direct sac was plicated with vicryl 1. Prolene mesh measuring 6 cms x 11 cms was fashioned to the anatomic region and used to reconstruct the entire floor of the inguinal canal, by placing it under the external oblique aponeurosis. The mesh was fixed in place with 2/0 prolene suture. Wound closed in layers, external oblique stitched with chromic catgut 1, subcutaneous tissue with chromic catgut 2/0 and skin with interrupted silk 2/0.

Cephadrine 500 mg IV, 8 hourly was used for first 24 hours and then oral cephradine 500 mg 8 hourly, for 48 hours.

## RESULTS

Out of the 108 patients 25 patients were smokers, 50 were ex-smokers and 33 non-smokers. The age incidence of patients ranged from 16 to 110 years, with mean age of 44 years. All patients were male. Sixty patients (55.6 %) presented with right sided hernia and 44 patients (40.7 %) with left sided hernia while 04 patients (3.7 %) had bilateral hernia. Seventy one cases were of indirect and 39 were direct hernias, 2 patients were operated for bilateral hernia.

Up to 30 years of age, all 31 cases were of indirect variety. Between the age of 31-50 years, out of 48 cases 22 were direct and 26 were indirect hernias. Patients above the age of 50 years were 32 in this series out of which 18 had direct hernia while 14 had indirect hernia. One patient had combined direct and indirect hernia. Hernias were

classified according to Gilbert classification; in our series, 60 were Type II, 15 were Type III, 30 of Type IV, 3 of Type V and 2 of Type VI.

Patients were discharged from the hospital within four days (mean 1.3 days). The cause of longer stay was scrotal haematoma, which occurred in 8 patients (7.2%). One patient was discharged on the same day of operation, 89 were discharged next day, 15 on 2nd post-operative day, 3 on 3rd, and 2 on 4th day.

The overall incidence of postoperative complication was 15.4%. All these complications were minor and managed conservatively. No operative mortality occurred in this study. Scrotal haematoma occurred in 7.2%, wound infection in 2.7% and post-operative pain in 5.5%.

## DISCUSSION

Inguinal hernia is the commonest problem among all external hernias, all over the world. In this series peak incidence was seen between 30-50 years of age (41.7%). There was no female patient in this series, indicating that the incidence in females is low. More over high illiteracy rate, ignorance and conservative background, prevent the ladies to consult surgeons, who are usually male. Inguinal hernia was more common on the right side, with incidence of 55.5%. Similarly increased incidence (56% - 63.2%) is reported by others<sup>2,5</sup>. Indirect variety was more common with incidence of 65.5% in this series. The incidence was lower than the other series (87.5%-91.4%)<sup>4,6</sup>.

The basic defect lies in the anterior abdominal wall, that allows hernia to develop in relation to a deficiency in the fascia transversalis. So repair of hernia in adults must include restoration of this layer which constitutes the posterior repair<sup>7,8</sup>. Various methods have been described for reconstruction and repair of posterior wall of inguinal canal. At present groin hernia repair is associated with 10% recurrence rate. Randomized trials reported in 1992 after Shouldice Repair indicate a recurrence rate for trainees, of between 4% and 10%<sup>10</sup>. Hernia recur due to two reasons. The early recurrence develops within 2 years of operation and is due to tension on suture line. The late recurrence develops many years after initial operation. Recurrence in this group is the result of disorder of collagen metabolism, particularly as it applies to fascia transversalis<sup>11</sup>.

An attempt to restore normal anatomy, utilizing patient's own defective tissue, is doomed to failure. Since Bassini first described the technique more than a century ago, virtually all hernia repairs have depended on surgical approximation of edges of the defect, which are not normally in apposition. The resulting suture line is always under tension, regardless of a releasing incision. Condon has demonstrated that transversus abdominus tendon

may insert into rectus sheath as much as 2 cm above the pubic tubercle<sup>12</sup>. This anatomic configuration explains why pubic tubercle is the most common site of recurrence. The internal ring is the 2nd common site as the presence of spermatic cord prevents complete approximation of the tissues. Any attempt to approximate semi rigid transversus tendon to rigid tubercle, ileopubic tract, Poupart's or Cooper's ligament, whether it is Shouldice or McVays approach, invariably results in distortion of the anatomy and tension on suture line. Insertion of free onlay mesh is relatively easy to learn, can be accomplished satisfactorily by junior surgeons and is more adaptable to a non specialised centre.

Prolene mesh is not expensive (approximate cost Rs. 600) and should the recurrence rate be kept below 1%, it is not over treatment. To avoid high incidence of recurrence due to age and weakened tissue component, the posterior wall of inguinal canal is reinforced with mesh<sup>13</sup>. It has been reported that 50% of recurrences appear during 1st year and most in 1st 3 to 6 months<sup>14</sup>. In our present series, no recurrence has been observed after 2 years follow-up.

One of the important purposes of our study was reduction of hospital stay after hernia surgery in Pakistan. In this series total hospital stay was 0-4 days (Mean 1.3 days). Most of the patients were discharged on first post-operative day. The hospital stay was quite prolonged as is reported in most of the other series carried out in Pakistan. For example mean duration of post operative hospital stay was 7.5 days in study reported by Desa<sup>15</sup>. Similarly post-operative hospital stay of 6 days (average) was reported by Sattar et al<sup>2</sup>. While in another series patients were discharged 2-5 days after surgery with average post-operative hospital stay of 3 days<sup>16</sup>.

Use of local anaesthesia was another factor in early discharge from hospital. All the hernias in this series were operated under local anaesthesia. In Pakistan local anaesthesia has been used for hernia repair, only in selective cases in series of 96 cases by Desa<sup>15</sup>, only 7 cases were operated under local anaesthesia. In a series of 60 cases by Ahmed<sup>17</sup>, local anaesthesia was used. Local anaesthesia avoids systemic side effects associated with general, spinal or epidural anaesthesia. It has a wide safety margin. Cost of mesh repair under local anaesthesia was significantly low as compared to general, spinal or epidural anaesthesia.

Complications recorded during our study are comparable to other series. In our series wound infection occurred in 03 patients (2.7%) which was superficial and no patient required removal of mesh. Ofilio<sup>18</sup> reported an infection rate of 4.3% after local anaesthesia and 6.8% after general anaesthesia. Incidence of wound sepsis observed by

Zafar et al<sup>16</sup> was 1.9 % in patients who underwent lichtenstein repair and 6% in patients who had hernioraphy respectively. Sattar et al reported it at 7.5%<sup>2</sup>. In this series injectable diclofenac sodium was used for relief of pain for 24 hours. Only 6 patients (5.5%) required oral NSAIDS for 4-7 days after discharge from hospital as compared with Zafar et al who reported in 09 patients (16.7%)<sup>16</sup>. No patient developed retention of urine in this series.

### CONCLUSION

This study consisted of 108 patients from various age groups who underwent Lichtenstein hernia repair by placing prolene mesh under external oblique apponeurosis, under local anaesthesia. The incidence of recurrence is nil after 2 years follow-up. The morbidity is low and hospital stay very short (mean 1.3 day). Cost of repair also was significantly low. Therefore lichtenstein repair is strongly recommended for the treatment of inguinal hernias.

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# ACUTE RENAL FAILURE : AN EXPERIENCE AT JPMC

SAJID MAHMOOD SYED, REHANA AKHTAR, M.H. OSMANI AND SHABNAM FAROOQUI

## ABSTRACT:

*This study was carried out to identify the determinants of acute renal failure (ARF), various treatment modalities and outcome in patients suffering from renal problems. A total of 705 patients suffering from ARF requiring admission in the Department of Nephrology, JPMC, Karachi, were studied over 11 years (1985-1996) period. The mean annual incidence of ARF was 4.5%. The risk was 1.6 times higher in males. Age ranged from 15 to 98 years. Over 55% patients were under 40 years of age. Volume depletion and septicaemia were the most frequent causes of acute renal failure. Overall mortality was 40% with septicaemia (44%) being the major killer. Fifty-five percent patients recovered with conservative management, 40% required dialytic support and 5% needed surgical intervention. We conclude that a better understanding of patho-physiology of ARF, prompt recognition and management of the causative factors, improved pre- and postoperative care, especially in surgical and obstetrical wards, might improve the outcome in these cases.*

**KEY WORDS:** Acute Renal Failure, Etiology, Determinants of ARF, Treatment

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## INTRODUCTION

Acute renal failure (ARF), a rapid reduction in kidney function that results in decreased glomerular filtration rate and tubular function, is caused by different factors and may result in multiple organ dysfunction. Major causes of ARF are divided into three broad categories: (a) pre-renal or hypoperfusion state, (b) intra-renal or intrinsic renal parenchymal disease, and (c) postrenal or urinary obstruction disorders<sup>1</sup>.

In patients with pre-renal azotemia the underlying pathogenic abnormality is renal tubular cell damage; vascular and glomerular damage is often secondary to immunologic mechanism. Interstitial nephritis, often drug induced, results from an immunologically mediated inflammatory renal response. Postrenal obstructive disorders result from partial or complete blockade of urine flow.

Drug therapy is directed at preventing or reversing the renal lesion before ARF is established and supporting the patient to allow the body to correct the lesion once it has occurred. Prevention of pre-renal azotemia and intra-renal disease is directed at identifying patients at risk, minimizing nephrotoxicity, and maintaining adequate urine output. Treatment of established ARF should be directed towards maintaining fluid and electrolyte balances, homeostasis and controlling complications resulting from retained nitrogenous waste products. This may necessitate the

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aggressive use of dialysis. As yet there is no proven means to prevent ARF or alter the course of ARF once it has established.

The present study was done to determine the incidence of ARF at JPMC, Karachi, to identify the determinants of ARF, to find out various factors leading to ARF, to assess the affect of various treatment modalities on outcome of ARF and to set recommendation for the improvement of results.

## PATIENTS AND METHODS

All cases of ARF over the age of 15 years presenting to various departments of JPMC were selected for the study. Inclusion criteria for ARF were: short clinical history of renal dysfunction, sudden stoppage of urine formation, and sudden rise in blood urea nitrogen and serum creatinine in a previously healthy patient. All patients attending our OPD, casualty or admitted to medical, surgical and obstetric wards fulfilling the inclusion criteria were included in the study.

For each patient blood was taken for haematology and biochemistry which included haemoglobin, blood urea nitrogen, serum creatinine, electrolytes, serum calcium, inorganic phosphorous, serum uric acid, liver function tests, test of urine if available for detailed report, detection of haemoglobin and electrolytes. Ultrasound was done on every patients.

## RESULTS

A total of 15,807 patients attended the department during the study period. Of these 705 cases presented with ARF. There were 60% males and 40% females, when gender related causes of ARF were excluded the incidence of age in male was 1.6 times that of females. The incidence of ARF remained similar from 49/1000 patients of renal diseases attending the department in 1985 to 50/1000 patients in 1989. Then there was a sudden rise in 1990 to 70/1000 cases which went on increasing. This was probably due to better understanding of ARF, prompt identification and timely referral (Figure-1).

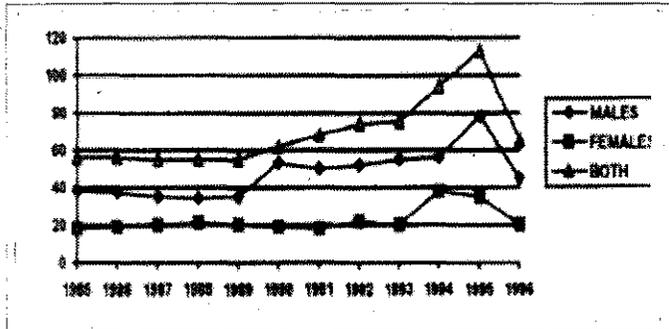


Figure 1 ARF, prompt identification and timely referral.

Age-wise distribution showed that most of the cases belonged to the second decade of life. Female preponderance was seen in the second and fourth decades and male preponderance in other age groups (Table-I).

Age (yrs)	Male	Female	Total	Commulative frequency
15-19	52	26	78	11.0
20-29	100	154	254	47.0
30-39	66	32	98	60.9
40-49	20	40	60	69.4
50-59	85	42	127	87.4
> 60	39	49	88	100.0

In majority (75%) of cases, the cause of ARF was medical related, in 16% it was obstetric, and in 9% it was due to obstruction in the urinary tract leading to retention and azotemia. (Table-II). Of the medical causes 16.7% cases were due to volume depletion, 12.3% due to septicaemia, 10.2% glomerulovascular, and 6% torture induced. Majority of torture induced ARF presented in 1990 when there were disturbances in the city.

Conventional treatment was provided to all patients according to the cause of ARF. Dialytic support was given when medical management was thought to be insufficient. Surgical intervention was done in 5% cases having obstruction (Table-III).

TABLE II BREAK-UP OF MEDICAL CASES

Aetiology	Male	Female	%
Volume Depletion	85	33	16.7
Sepsis	57	30	12.3
Glomerulovascular	49	24	10.2
Hepatorenal	48	20	9.4
Reduced Cardiac Output	33	18	7.9
G6 PD deficiency	26	17	6.0
Snake Bite	36	07	6.0
Torture Induced Muscle Trauma	23	—	6.0
Drug Related	25	11	5.1
Mismatched Blood Transfusion	02	01	0.4

TABLE III TREATMENT MODALITIES

Type of treatment	% of cases
Conservative	55.0
Peritoneal Dialysis	33.3
Haemodialysis	52.4
Both Dialyses	14.3
Surgical intervention	05.0

Insults leading to ARF included were sepsis, volume depletion, hepatorenal and other mentioned in table II. Each insult was given one number. Mortality was directly proportional to the number of insults, but septicaemia itself was a very lethal insult either as a single or in combination with other insults (Figure-II).

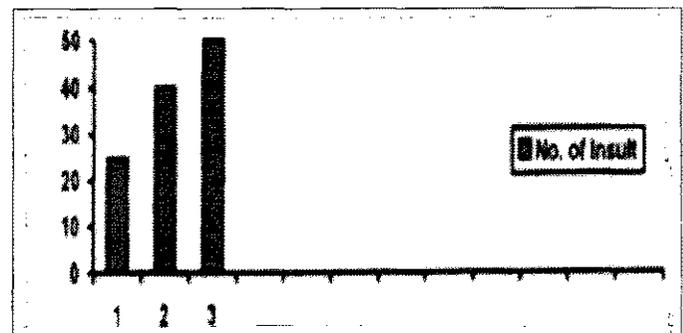


Figure 2 Mortality according to number of insults

Mortality was lowest in 10-20 years age group (8%) and highest in 21-40 years age group (50%). It was 12% in patients more than 60 years of age.

## DISCUSSION

Jinnah Postgraduate Medical Centre, Karachi, is not the only hospital to cater cases of renal failure in the city, therefore our results do not reflect the incidence of acute renal failure (ARF) in the city. In the eleven year study period the mean annual incidence of ARF was 44.6/1000 cases. Yearly break-up of the incidence of ARF shows an increase from 1989 which might be due to increased awareness of ARF and improved referral. In 1990, the incidence of ARF in males had almost doubled. The cause in most of the cases was torture induced as the law and

order situation was bad during that year and torture was induced by punishment through aggressive exercise. Seasonal variation was also noted and in summer more cases of gastroenteritis, hepatitis, and snake bite were seen.

When gender related causes of ARF were excluded, the incidence in males was 1.6 times that of females. A survey of 32 centres in Europe, North Africa and the Near East<sup>2</sup> revealed that the incidence of ARF varied from 0.4 patients/million/year in Algiers to 177 patients/million/year in Lebanon. In USA, less than 1% of all general hospital patients are affected. In Kuwait, the incidence was 14.7/100,000 population<sup>3</sup>. In Saudi Arabia, the incidence of ARF was estimated to be 155.2/million population per year<sup>4</sup>. Patients over 60 years of age are at a higher risk for developing ARF. A study on older patients in Spain showed that incidence and mortality were 3 to 5 times higher in older patients than younger in all types of ARF<sup>6</sup>. Age should not be used as a discriminating factor in therapeutic decision concerning ARF.

The pathogenesis of ARF is often multifactorial and numerous clinical events have been listed to cause ARF. In this study the major contributing factors in three-fourth of the cases were related to medical causes. Of the remaining 25%, 16% were obstetric renal failure and 9% surgical in origin. These results are similar to that of India where out of 1,862 patients, medical causes were responsible for ARF in 60% cases, surgical causes 25%, and obstetrical causes in 15% of cases<sup>2</sup>. The trend in developed countries is almost the same, however, obstetrical renal failure has declined to virtually zero. Advances in obstetrical care are likely reason for the decreased incidence. In our study overall mortality was 40% with septicaemia as the major cause, i.e., 44% specific mortality. In

50% deaths, three causative factors lead to ARF. Mortality decreased with the decrease in the number of insults. Similar mortality rate was observed in an other study<sup>4</sup>.

In this study majority of the deaths occurred between second and fourth decade of life with majority comprising females having ARF due to obstetric cases like abruptio-placentae, prepartum and postpartum haemorrhage, septic abortion and puerperal sepsis. In this study the mortality due to acute diarrhoeal disease was low as compared to the study carried out in Madras which had a 54% mortality<sup>5</sup>.

## CONCLUSION

In patients with established renal failure, intravascular volume and pressure must be rapidly corrected and underlying problem identified. Fluid, electrolytes, and acid-base balances are critical factors which should be dealt with aggressively and treated adequately to improve the mortality rate.

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# A MEDICAL AUDIT OF THE FREQUENCY OF OVARIAN TUMOURS

NAILA TARIQ AND S. M. ALAM

## ABSTRACT:

A study was conducted on the frequency of ovarian tumours in the past 23 years from 1970 to 1993 in the Department of Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi. There were a total of 1401 ovarian tumours of which 1044 were benign, 343 malignant and 14 borderline. Epithelial tumours were 1048; of these 800 were benign, 234 malignant and 14 borderline. The sex cord stromal tumours were 51 and the germ cell tumours 251.

**KEY WORDS:** Ovarian tumours, Frequency

## INTRODUCTION

Tumours of the ovary are common neoplasia in women. Among cancers of the female genital tract, ovarian cancer ranks third in incidence, while cancers of the cervix and endometrium rank first and second respectively<sup>1,4</sup>. Ovarian tumours are notorious for their large size and relatively mild symptoms.

In Pakistan, a survey, on the frequency of malignant tumours was conducted by the Department of Pathology and Radiotherapy of Jinnah Postgraduate Medical Centre, Karachi from 1960 to 1972. The percentage of ovarian tumours reported by the Department of Pathology and Radiotherapy was 3.4% and 4.2% respectively<sup>5</sup>. In another study carried out by the Pakistan Medical Research Council (PMRC) in seven centres from April 1973 to October 1974, the frequency of ovarian cancer was found to be 4.3% and it was eleventh in order of frequency<sup>5</sup>. In two separate studies conducted by PMRC during 1973 to 1974 and 1977 to 1980, ovarian tumours were seventh (4.3%) and fourth (4.7%) respectively in order of incidence. A clinicopathological study of 107 ovarian tumours was carried out at Army Medical College, Rawalpindi during 1980 to 1985. The frequency of benign tumours was 72.85% and that of malignant tumours 27.06%<sup>6</sup>. In Western Countries, ovarian tumour accounts for considerable portion of clinically important tumours in females. Ovarian cancer is the sixth most common form of cancer. In Britain, ovarian cancer is the fourth commonest cause of death from malignancy. The incidence rate is fairly low in Southern Europe and South America and very low in Japan which suggests environmental factors. The incidence of ovarian epithelial carcinoma is increasing at the

rate of 1.5% yearly. Because of the low cure rate, the tumours cause 7.3% of cancer deaths in females in U.S.A.

About 2/3rd of the ovarian tumours are encountered in the reproductive age period and over 90% between the age of 20 to 65 years. Less than 02% are found in children<sup>7</sup>. The death rate was higher in nulliparous than in parous women. There was a higher incidence of ovarian cancer in menopausal women, suggesting the role of elevated pituitary gonadotrophin levels in the development of the disease. The relative frequency of various histological types of ovarian cancers pointed out in many local as well as international studies showed increased frequency of epithelial ovarian cancer<sup>8-10</sup>.

Purpose of study is to observe the frequency of ovarian tumours especially malignant tumours and to identify the various histological types of tumours prevalent in specimen sent to BMSI for Histopathology.

## MATERIAL AND METHODS

This study is a retrospective study of ovarian tumours from 1970 to 1990 which were reviewed from the slides filled in the official records. Prospective study was made from 1990 to 1993. The tissue was fixed in 10% buffered formalin, processed as per routine laboratory procedure and then embedded in paraffin for block preparation. Special stains were done where necessary. A total of 4 sections were cut from each paraffin block. The sections were stained with H&E (Haematoxylin and Eosin), PAS (Periodic Acid Schiff), and Mucicarmine and one section was kept as reserve.

## RESULTS

Total number of tumours received in the last 23 years (1970-1993) were 1401. Of these, 1044 were benign, 343

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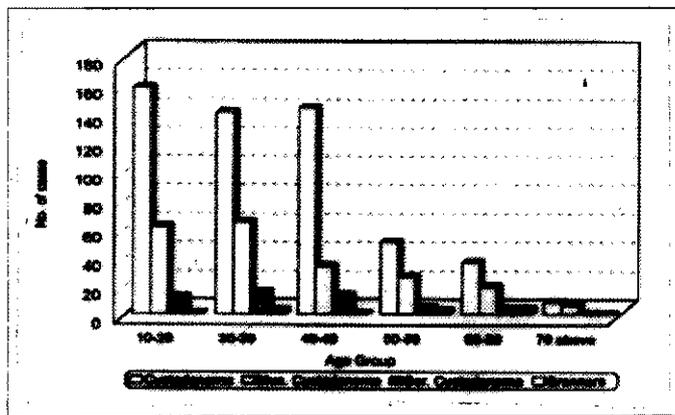


Figure 1 Frequency of benign epithelial tumours during 1970-1993 for various age groups

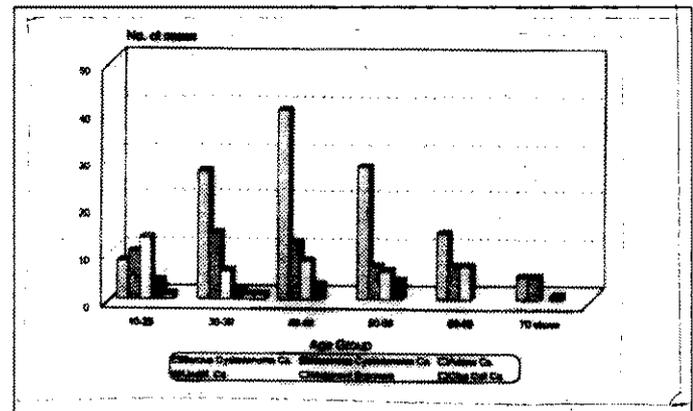


Figure 2 Frequency of malignant epithelial tumours during 1970-1993.

malignant and 14 borderline ovarian tumours. Among these, a further break up was done on the frequency and age distribution of different morphological types. Total number of epithelial ovarian tumours in the study group was 1048. Of these 800 were benign, 234 malignant and 14 borderline. Total number of sex-cord stromal tumours was 51. Of these 13 were benign and 38 malignant. Total number of germ cell tumours in the series was 251. Of these, 212 were benign and 39 malignant. Only two cases were of lipid cell type. Metastatic tumours were 30 in number. Tumours of general stroma not specific to ovary, were 19.

Maximum number of epithelial tumours were seen between 10-29 and 30-49 years of age, the two peak age groups. (Fig. I and Fig. II). The most common type was serous cystadenoma and serous cystadenocarcinoma. Next in frequency was mucinous variety with smallest number of Brenner's tumour. The most common benign sex-cord tumour was thecoma, while the most common malignant tumour was granulosa cell tumour. The commonest benign tumour of germ cell origin was benign cystic teratoma while dysgerminomas topped the list of malignant germ cell tumours. Metastatic tumours were mostly adenocarcinomas, and were observed in the sixth and seventh decades.

Benign general stromal tumours, not specific to ovaries, were 19 in number with fibroma being the commonest.

## DISCUSSION

Our figures for the frequency are in accordance with the study carried out in Army Medical College, Rawalpindi, between 1980 to 1985; which reported the frequency of 72.85% and 27.06% of benign and malignant tumours respectively<sup>6</sup>. The study also correlated with similar studies carried out in the West<sup>9,11</sup>. The age distribution for different morphological types in our study revealed that the benign tumours were maximum in 2nd & 3rd decades

while the malignant tumours were seen mostly between 30 to 49 years. The American Cancer Society group in 1992, reported a peak in fifth and sixth decades for the malignant ovarian tumours<sup>12</sup>.

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# MANAGEMENT OF ACUTE ORGANOPHOSPHATE INSECTICIDE POISONING

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## ABSTRACT:

*A prospective study to determine the effectiveness, early recovery and complications of atropine and atropine plus pralidoxime in the treatment of acute organophosphate insecticide (OPI) poisoning was carried out at the National Poison Control Centre at Medical Unit-I JPMC, Karachi. Forty patients divided randomly into two groups of twenty each were studied. Age ranged from 15-39 years. 27 were females and 13 males. 34 cases were suicidal and 6 were accidental. Serum cholinesterase ranged from 9% to 44% of normal. Total dose of atropine given to group A was 9119 mg and to group B was 5619 mg. High doses of atropine and pralidoxime were very effective in the treatment of OP poisoning with fewer side effects and complications. Addition of Pralidoxime reduced the dose of atropine and recovery was earlier.*

**KEY WORDS:** Organophosphate poisoning, Atropine, Pralidoxime

## INTRODUCTION

Organophosphate compounds are used as insecticides in agriculture and for domestic purposes. Although these chemicals have brought blessings to humanity, in the form of control of diseases, and increased agricultural yield, poisoning from these chemicals has become a constant threat to human life. Occupational poisoning occurs in field and plant workers. Poisoning also occurs accidentally or as a result of suicide attempts.

Acute pesticide poisoning is a major problem in developing countries. In Sri Lanka, agrochemicals account for nearly 60% of all poisonings. Recent WHO figures at global level have estimated approximately 3 million cases hospitalized and approximately 20,000 deaths due to acute pesticide poisoning<sup>1</sup>. Organophosphate insecticide poisoning is common in our country; its incidence and mortality are high. About 2500 cases of poisoning occurred in Pakistan during 1996 among spraymen using malathion and five of them proved fatal<sup>2</sup>.

The purpose of present study was to define the effective mode of management of patients with acute OPI poisoning so as to achieve early recovery from effects of poisoning and to reduce the rate of complication.

## PATIENTS AND METHODS

A prospective study was conducted at the National Poison Control Centre (ICU) of Medical Unit 1 Jinnah Postgraduate Medical Centre, Karachi from February to December 1997.

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Forty patients with history of exposure to OPI were included in the study. They were divided into two groups on random basis. Each group consisted of twenty patients. They were matched for age, sex and cholinesterase level.

- **Group A:** Patients with acute OPI poisoning treated with high dose regimen of atropine.
- **Group B:** Patients with acute OPI poisoning treated with combination of atropine and pralidoxime.

They were compared for duration of improvement in signs and symptoms of poisoning and complications of the disease and drugs.

## RESULTS

Out of 40 cases of acute organophosphate insecticide poisoning, 34 were suicidal and 6 were accidental. There were 27 females (67.5%) and 13 males (32.5%). Age ranged from 15 to 39 years. Maximum number of patients were between 20 to 29 years of age. 21 patients were housewives, 8 students, 7 labourers, one factory worker and one teacher. 24 patients were married and 16 were unmarried. Substances responsible for acute poisoning included finis, typhoon and anti-lice powder.

Clinical observations, at the time of admission revealed pupillary constriction (miosis) in 36 (90%), excessive salivation in 37 (92.5%), excessive lacrimation in 30 (75%), fasciculation in 22 (55%), muscle weakness in 8 (20%), cyanosis in 6 (15%), convulsions in 3 (7.5%), disorientation in 14 (35%) and Loma in 8 (20%). Gut sounds were increased in 38 (95%) cases and slurred speech was present in 28 (70%) cases.

Investigations revealed that blood glucose ranged between 74 mg to 211 mg/dl, serum sodium from 128 to 141 mg/L, potassium from 3 to 4.2 mg eq/L and Serum Cholinesterase from 9% to 44% of normal. Serum amylase had increased in one patient above normal levels. ECG showed Q-Tc interval prolongation in 3 cases (7.5%).

Atropine as antidote was given to all patients according to the protocol and pralidoxime was given only to 20 patients, belonging to group "B". The total dose of atropine given to 20 patients in group 'A' was 9119 mg, while in group 'B' it was 5619 mg. Each patient in group 'A' needed an average of 455.9 mg atropine, while in group 'B' 280.9 mg. Each patient in group 'A' needed on an average 175 mg, more than the patients in group 'B', who were treated with combination of atropine and pralidoxime.

Minimum duration of stay in hospital, in patients with acute organophosphate insecticide poisoning was 4 days and maximum 10 days. Mean duration of stay in group 'A' patients was 7.15 days, while it was 5.15 days in Group 'B', an average of 2 days less than group 'A' patients.

## DISCUSSION

In this study maximum number of cases were in the age group of 20-29 years (62.5%)<sup>3</sup> ranging from 15 to 39 years<sup>1</sup>. Accidental poisoning occurred in 6 cases<sup>3,4</sup>, while 85% cases were suicidal attempts<sup>5</sup>. In the present study no case of homicide was recorded as described in literature<sup>16,7</sup>.

Due to low level of consciousness and depressed cough reflex in poisoned patients, there are higher chances of aspiration pneumonia<sup>8</sup>. The cause of death in most studies was acute respiratory failure due to pulmonary edema<sup>9</sup>. But in our study no fatality was recorded, while on the day of admission 29 (72.5%) patients had increased secretions and dyspnoea was noted in 28 cases. In this study, there were no respiratory complications because of antibiotic cover, continuous aspiration of stomach through nasogastric tube, thus preventing aspiration pneumonia and high dosage schedule of atropine, which kept the bronchial tree dry, contrary to other studies<sup>9</sup>.

Out of 170 cases in one study, 67 showed cardiac arrhythmias, with prolongation of Q-Tc interval and premature ventricular contractions<sup>10</sup>, while in our study 7.5% patients showed prolonged Q-Tc interval. Pinpoint pupil, not reacting to light is the hallmark of acute O.P.I. poisoning<sup>11</sup>. In this study miosis was present in 90% of cases which responded to atropine, a useful diagnostic aid in acute OPI poisoning<sup>12</sup> while in other studies it has been reported between 64% to 73%<sup>3,13</sup>. Salivation, lacrimation and sweating were present in 92.5%, 75% and 70% cases respectively, in conformity with other studies<sup>14</sup>. Fasciculations were found in 22 (55%) on the day of

admission<sup>6</sup>, while they disappeared with treatment in group 'B' patients much earlier than group 'A' patients. Psychosis in patients with acute OPI poisoning occurs during treatment with atropine and it is dose related<sup>4</sup>. In the present study it was found in 57.5% cases, as reported in literature<sup>14</sup>. Convulsions occurred in 3 (7.5%) cases in severely intoxicated patients in the first 48 hours<sup>15</sup>. Disturbance of consciousness in this study was similar to that determined by De-Bleeker<sup>16</sup>. Leucocytosis was found in 18 (45%) cases with shift to left, as usually occurs in cases of severe poisoning<sup>6</sup>. Blood glucose level had increased in some cases, as also noted in other studies<sup>17</sup> along with increase in serum amylase in one case. Serum cholinesterase level is one of the diagnostic criteria for acute OPI poisoning<sup>18-20</sup>. In the present study, serum cholinesterase ranged from 9% to 44% of normal.

The clinical picture of acute OPI poisoning results from parasympathetic over-activity, due to accumulation of ACh at nerve endings, which needs higher than therapeutic doses of atropine. Favourable response to atropine is useful diagnostic aid<sup>12</sup> than cholinesterase assays, as treatment is often initiated before laboratory results are available.

The effectiveness of high doses of atropine has been advocated<sup>11,20</sup>, sometimes very large doses has been administered, upto 30 gm in one reported case<sup>21</sup>. In the present study, we have used atropine, 170 to 200 mg in first 24 hours, with favourable results. Cholinesterase reactivators, Pralidoxime (Contrathion) restores AChE activity, inhibited by Organophosphates. Recovery of consciousness and disappearance of symptoms, especially weakness and fasciculation, occurs within 10 to 40 minutes. Pralidoxime can be administered in continuous I/V infusion<sup>6</sup>. Prompt improvement in ECG and the level of consciousness was observed in the intoxicated patients, when I/V infusion of pralidoxime was started, which indicate drugs access to the important brain regions<sup>22</sup>.

Effective treatment with oximes reduces the required dose of atropine<sup>11</sup> as is evident from the present study in which an average of 455 mg of atropine were given to each patient from in 'A', whereas 280 mg of atropine were given to each patient in group 'B'. The combination of atropine and oximes is more effective<sup>11</sup>. It prompts the recovery of patient from manifestations of intoxications by earlier regaining of consciousness and quicker disappearance of symptoms and signs like fasciculation. It also reduces the rate of complications e.g. respiratory infections. It decreases the duration of stay in hospital.

In conclusion, high dose of atropine and pralidoxime was found very effective to counteract the effects of poison than atropine therapy alone. Combination therapy is more effective, it reduces the duration of hospital stay, is cheaper and is associated with fewer side effects and

complications. Therefore it is recommended that high doses of atropine with pralidoxime should be used for management of acute organophosphate insecticide poisoning.

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# ILEAL DUPLICATION: AN EXPERIENCE WITH THREE CASES

## Case Report

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### ABSTRACT:

*Duplication of the digestive tract is a rare entity that can be located in any part of gastrointestinal tract. However the most frequent location is the ileum. Surgery is the treatment of choice. In this paper we are presenting our experience of 3 cases of Ileal duplication having interesting features along with review of literature.*

**KEY WORDS:** *Ileal Duplication, Diagnosis*

### INTRODUCTION

The enteric duplication is a rare phenomena<sup>1,3</sup> and it can be located at any level<sup>4,6</sup>. Sometimes these duplication could be a diagnostic as well as therapeutic challenge<sup>5,7</sup>.

Pre-op diagnosis of this condition requires highest index of suspicion. Prompt recognition and management is generally associated with an excellent outcome<sup>8</sup>.

### CASE REPORTS

#### CASE I

A 2 years old girl was admitted with the history of intermittent abdominal distention and vomiting since infancy. Barium meal and follow through could not reveal any abnormality. On ultra sound abdomen there was a suspicion of intestinal duplication. A repeat ultra sound when the patient was in an acute episode of distention revealed a fluid filled mass. At laprotomy it was confirmed to be in the area of terminal ileum, about 20 cm proximal to the ileocecal junction. The duplicated segment was excised and end to end ileoileal anastomosis was performed.

The dissection of excised specimen (Figure 1) demonstrated a common wall on the antimesenteric surface with a communicating fenestral opening which used to fill the duplicated portion of the bowel, with intestinal contents resulting in distention and partial volvulus. The mucosa of duplication was identical to the adjacent ileum. Postoperatively the recovery was uneventful and she has remained well for the last 5 years.

#### CASE II

A girl of 11 was admitted with history of chronic intermittent colicky abdominal pain for one year. This was associated with episodes of vomiting and abdominal distention.

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She was also suffering from chronic ill health. Later also she developed bilious vomiting. On examination the girl was of lean built and had diffuse abdominal distention. No abdominal mass was palpable. Routine hematological and biochemical investigation were all normal. A plain X ray revealed grossly dilated bowel loops with multiple air fluid levels. Graffin Follow through showed grossly distended small gut with marked impression of valvulae connentes indicating acute on chronic obstruction.

At laprotomy multiple small bowel loops matted with each other near the terminal ileum and enlarged mesenteric lymph nodes seen. Proximal to the matted loops the gut was massively dilated with hypertrophic walls. These



**Figure 1** Tubular ileal duplication with a fenestral communication. Note the fusion is wall to wall on the antemessenteric surface with identical pattern of mucosal surface and fully developed muscle layers.

loops could not be separated from each other and were excised en mass and the proximal ileum was anastomosed with the caecum<sup>9</sup> to restore the continuity of the bowel. One of the enlarged lymph node was biopsied.

The excised specimen of intestine on dissection revealed the tubular duplication with one internal communication. The wall of duplicated bowel was common with the main ileum. Histopathology revealed typical ileal mucosa, muscularis mucosa, muscle layers and serosa. Sections of the mesenteric lymph node revealed nonspecific inflammatory enlargement.

### CASE III

A 2 years and 9 months old boy presented with history of dyspnoea for 7-8 months and failure to thrive. Routine hematological and biochemical investigations were within normal limits. Plain X-ray of chest and abdomen showed right sided diaphragmatic hernia. Further contrast studies revealed it to be posterolateral hernial defect.

Through right subcostal approach the hernial contents were reduced and the defect was repaired with interrupted non-absorbable silk sutures. On exploration of the intestine a large cystic duplication (Figure 2) of proximal ileum was found accidentally. It was communicating with the parent ileum and had a common muscular wall. It was excised and end to end anastomosis was performed. Histology of the excised specimen confirmed it to be a duplicated bowel with fully developed mucosal layers but no ectopic mucosa was detected.



**Figure 2** A patient who was operated for diaphragmatic hernia was incidentally found to have a cystic ileal duplication confluent with the main intestinal surface. Wedge excision and end to end anastomosis was performed.

### DISCUSSION

In most instances the term duplication is probably erroneously used, as the vast majority of gastrointestinal duplications are really enteric cyst and not true duplication. The word duplication was first coined by Fitz in 1884<sup>1</sup> but Ladd in 1937<sup>2</sup> used the term to simplify the classification of a number of forms of the anomaly including enteric cyst, Various forms of diverticula, and truly duplicated small and large intestine<sup>3</sup>.

Duplication of the digestive tract are very unusual entities that can be located in any part of the gastrointestinal tract<sup>4,5</sup>. However the most frequent location is the ileum<sup>7</sup> followed by esophagus and duodenum<sup>1</sup>. Among all the gastrointestinal duplications approximately 75% are thoracoabdominal. In about 10% of cases these are multiple<sup>1</sup>. The relatively thick wall of the duplication makes it easy to differentiate it from the typical thin walled mesenteric cyst.

Intestinal duplications may be classified in several ways<sup>1</sup>. But for practical purposes these structures may be divided into two groups. Cystic duplications (75%) which are usually closed and Tubular (25%) that usually communicate with the visceral lumen at their caudal end or, occasionally, at both ends. Two of our cases had tubular duplications which were communicating with the parent bowel. Rarely they have separate mesentery<sup>1</sup>. Duplication vary enormously in size and shape. Most are 2 to 4 cm, round and cystic but can acquire huge size that may insinuate into the thorax and fill it completely<sup>3</sup>. These duplication are mostly lined by some sort of GI mucosa. Approximately 25% of such cases will have ectopic tissue present, and most of the times it will be gastric. But in none of our cases ectopic mucosa could be detected.

Preoperative diagnosis is extremely difficult. Plain abdominal films are of little use. Ultrasound findings are generally sufficient to establish a diagnosis and to justify laprotomy. Barium studies could help in instances where there is some sort of communication between the duplication and the intestinal lumen. Sometimes computed tomography has also been employed to delineate the surrounding structure<sup>2,5,6</sup>. Approximately 10% of patients with small bowel duplication will have associated thoracic duplications.

Surgical correction is the treatment of choice, preferably with complete removal of the cystic or tubular duplications and end-to-end anastomosis as was performed in all of our cases. Unfortunately, they occur on the mesenteric side of the intestine and their excision nearly always requires resection of an equal length of the normal gut, which is impractical most of the times. In case where the duplication communicate with the intestine at distal end, a proximal communication can be formed creating a double-barreled intestine.

Sometimes patients may be managed by partial resection and internal drainage at the distal end. If ectopic gastric mucosa is found it should be carefully stripped from the wall to avoid subsequent GI hemorrhage.

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