



## Surgery

## A CLINICAL STUDY AND MANAGEMENT OF INGUINO-SCROTAL SWELLINGS IN CHILDREN: AN INSTITUTIONAL EXPERIENCE

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**ABSTRACT** **Introduction:** Inguinoscrotal swellings are one of the commonest anomalies in infancy and Childhood throughout the world. All pediatric inguinal hernias require operative treatment to prevent the development of complications, such as inguinal hernia incarceration or strangulation. This study was aimed to know the clinical presentation of inguinal hernia in children, age ranging from 9 months to 12 years, management of inguinal hernia in children and other associated conditions.

**Patients and Methods:** Forty children were selected ranging in age from 9 months to 12 years presenting with inguinoscrotal swelling which were examined, followed up and managed.

**Results:** The inguinal hernia was most common among male children (87.5%) hereby giving a ratio of M: F=5.6:1. Right sided (60%) inguinoscrotal swellings were more common than left (35%). High ligation at the level of deep ring was done in all the cases. In this series of 40 children, there were 2 cases of incarceration. But none had strangulation and gonadal infarction.

**Conclusion:** Presence of contralateral patent processus vaginalis on USG doesn't necessitate routine contralateral groin exploration. Emergency herniotomy is not associated with increased intra-operative or post-operative complications.

**KEYWORDS :** Inguinoscrotal, Inguinal hernia, Hydrocele, Pediatric, PPV.

**INTRODUCTION:**

Hernia is a Latin term meaning 'rupture of a portion of a structure'. Inguinoscrotal swellings are one of the commonest anomalies in infancy and childhood throughout the world. Most of these swellings are congenital and they have an asymptomatic presentation. They are related to the descent of the testes and the processus vaginalis<sup>1</sup>. To date, the mechanism of the testicular descent is speculative, with various hypotheses being put forth, the most recent one being that of "WATER-TRAP" which was made by Heyns and Deklerk. The abnormalities in the descent result in ectopic or undescended testes. The undescended testis which is found in more than 90% of the cases is associated with congenital inguinal hernias<sup>2</sup>.

Congenital inguinal hernias are common in infants and children, for which surgery constitutes the most frequent method of treatment in the paediatric age-group. The difficulties which are encountered in paediatric inguinal hernia are operative difficulties which are connected with a thin transparent sac, which is the association with the undescended testis and the different opinions on the timing of the operation when the two conditions co-exist. The other difficulty is whether a contra-lateral exploration should be performed or not, and if so, whether the decision should be based on the site, age or sex.

A controversy exists for routine contra-lateral exploration in the absence of a clinical inguinal hernia. Various modalities have been described for detecting contralateral hernias, but their efficacy and necessity are debatable. This study is intended to find out the relation of various factors like age, sex, side, maturity etc. with inguinoscrotal swellings in children, and also to find out the associated anomalies and outcome of surgical intervention in pediatric patients with inguinoscrotal swellings in our hospital.

**PATIENTS AND METHODS:**

The present study was conducted in Department of Surgery, Mamata General Hospital. Patients were selected by a simple random sampling selecting the first 40 patients registered within the time period, November 2013 to September 2015 including a follow-up period of 52 weeks.

Congenital inguinal hernia were diagnosed by taking detailed history from parents in the form of site, size, history of non-reducibility and presence or absence of testis in scrotal sac. They were collected in a prescribed proforma which contained history, clinical examination, investigations and management. After obtaining the history, children

were examined systematically which included examination of inguinal region, scrotum and its contents. Children were subjected to routine investigations like Hb%, BT, CT and specific investigation like ultrasound (USG) for the presence of contralateral patent processus vaginalis (CPPV).

**RESULTS AND OBSERVATIONS:**

The age of the patients ranged from 9 months to 12 years. The maximum numbers of cases were seen in the age group of 2-3 year (12.5%) and the minimum numbers were in the age group 0-1 year (2.5%). Two (5%) children were born prematurely (before 37 weeks); one male and one female. There were 34 males and 6 females with a ratio of 5.6:1.

Among these 40 cases, 24 (60%) cases had swelling on right side, 14 (35%) cases on the left side, and 2 (5%) cases were bilateral. Thirty eight cases (95%) presented with asymptomatic swelling. Acute presentation was seen in 2 cases (5%). They presented with acute pain, vomiting and irreducibility. Undescended testis was noted on right side located in the superficial inguinal pouch in 1 case. Orchidopexy was done at the time of hernia repair and the testis was placed in the sub dartos pouch. 2 cases (5%) of incarceration were noted and none of them had strangulation or gonadal infarction.

Out of these 40 cases, 30 (75%) were inguinal hernias. Among these 30 cases of inguinal hernias, 20 were on right side, 9 cases were on left side and one case was bilateral inguinal hernia. Seven (17.5%) children presented with congenital hydrocele, 4 were noted on left side and one child presented with bilateral hydrocele. Three (7.5%) cases of encysted hydrocele of cord were encountered, 2 cases were noted on the right side and 1 case on the left side. The details of the cases are depicted in table-1.

Parameter	No. of cases	Percentage (%)	
Age	0-4 years	13	32.5
	5-8 years	13	32.5
	9-12 years	14	35
Sex	Male	34	85
	Female	06	15
Prematurity	Male	01	2.5
	Female	01	2.5

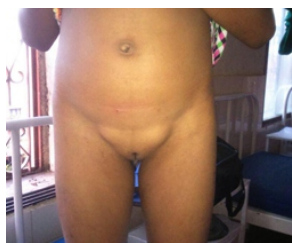
Side	Right	24	60
	Left	14	35
	Bilateral	02	5
Inguinal hernia (n=30)	Right	20	50
	Left	09	22.5
	Bilateral	01	2.5
Hydrocoele (n=07)	Right	02	5
	Left	04	10
	Bilateral	01	2.5
Encysted hydrocoele of cord (n=03)	Right	02	5
	Left	01	2.5
Associations	Undescended testis	01	2.5
	Hypospadias	00	0
	Ectopic testis	00	0
Presentation	Only swelling	38	95
	Incarceration	02	5
Presence of CPPV on USG (n=38)	02	5	

**Table 1: Distribution of cases according to demographic profile, prematurity, differential diagnosis, presentation, associations, and USG findings**

Thirty eight cases had unilateral pathology and were subjected to preoperative ultrasound. Out of those 38 cases, 2 cases (5%) were diagnosed to have CPPV. Out of those 2 cases, 1 was noted on right side, 1 on left side and both were males.

Infants and children below 9 years were operated under general anesthesia. Spinal anesthesia was used for children above 9 years. 30 (75%) cases were operated under general anesthesia and 10 (25%) cases were operated under spinal anesthesia.

The usual procedure for inguinal hernia in children was herniotomy. In this study, simple herniotomy (Ferguson's method) with or without complete excision of the sac were done for all the cases. In case of partial excision for male child, the distal portion was kept slit open to prevent hydrocoele formation whereas in the case of females, the distal portion of the sac was completely removed. In the case of encysted hydrocoele of the cord, the proximal portion of the processus vaginalis was checked for its patency by passage of a probe or injection of fluid.



**Fig 1. Bilateral inguinal hernia in a female**



**Fig 2. Hernial sac**



**Fig 3. Transfixation of sac**



**Fig 4. Encysted hydrocoele of the cord**

In this study, 3 cases of encysted hydrocoele of the cord had patent proximal processus vaginalis. High ligation of the patent processus vaginalis at the deep ring was done in case of congenital hydrocoele while the distal portion was kept slit open.

In the post operative period of 40 children, wound hematoma was noted in 2 cases (5%), wound infection in 1 case (2.5%) with a total

complication rate of 7.5%. During the follow up period of 12 weeks to 52 weeks, there was no incidence of recurrence on the same or contralateral side. The details of the complications are depicted in table-2.

Variable		No. of cases	Percentage (%)	
Mode of anaesthesia	General	30	75	
	Spinal	10	25	
Complications	Early post-operative	Hematoma	02	5
		Infection	01	2.5
		Gonadal infarction	0	0
		Testicular atrophy	0	0
	Late post-operative	Chronic groin pain	0	0
		Recurrence	0	0

**Table 2: Distribution of cases according to mode of anaesthesia and post operative complications**

**DISCUSSION:**

Inguinal and scrotal swellings in children form a majority of the surgical conditions which require treatment. Inguinal hernia repair is the most frequently performed operation in the pediatric age group. Studies from various centers have reported an incidence of 3.5 to 5.0% for the inguinal hernias in full term infants and an incidence of 44 to 55% in premature and LBW babies<sup>2,3</sup>. In this case series, 2 cases (5%) were found to be associated with prematurity (born before 37 weeks). Out of these 2 cases, 1 case was a female child who presented with bilateral hernia. The lower incidence in this case series might be due to less sample size.

In our study, the majority (57%) of the patients were below 7 years of age. According to the study by Okuribido et al<sup>4</sup> 55% of the children were below 7 years. About 71% and 87% of the children were below 7 years of age in the studies by Adesunkanmi AR et al<sup>5</sup> and Wright JE 6 respectively. There were 34 males and 6 females with the ratio of 5.6:1 in our study. Male to female ratio were 11.5:1, 9:1, 7:1 in the studies done by Jadhav<sup>7</sup>, Ravikumar<sup>8</sup>, and Marc I Rowe<sup>9</sup> respectively. In all the studies of inguinal hernia in children, there was male preponderance.

Childhood inguinal hernias are generally more predominant on the right side and this has been attributed to the delay in descent of the right testis. Thirty patients had inguinal hernia out of total study population. Out of 30 patients, 66.7% of patients had hernia on the right side, 30% on left side and 3.3% had bilateral hernia which was consistent with most of the previous studies. Other studies like H.Singh<sup>10</sup>, William B Kiesewetter<sup>11</sup>, Michel Gilbert et al<sup>12</sup>, Rowe M.I. et al<sup>9</sup> had similar findings.

Unlike the hernias, a higher incidence of hydroceles (n=7) was noted on left side rather when compared to right side (57% vs 28.5%) in our study. The incidence of hydrocoele in our study correlated with the study of Hugh B Lynn<sup>13</sup>. There were 3 cases of encysted hydrocoele of the cord, 2 on the right side and 1 on the left. All had patent proximal processus vaginalis which were proven by passing probe and injecting fluid. This amounts to an incidence of 7.5% which correlated with studies of Duckett J et al<sup>14</sup> who conducted 380 hernia operations and found 25 hydrocoele of cord with an incidence of 6.5%.

During the course of this study, 1 case of undescended testis was detected on the right side and situated in the superficial inguinal pouch. This child had orchidopexy at the time of hernia repair and testis was placed in the subdartos pouch. In a study by Ravi kumar<sup>8</sup>, incidence of undescended testis was 10%. According to Mlay and Sayi<sup>15</sup>, the commonest site for the undescended testis is the superficial inguinal pouch.

Direct inguinal hernias in children are rare and represent 0.5% to 1% of all groin hernias. In the present study no case was found to have direct hernia. The absence of direct inguinal hernia in the study may be attributed to the less number of cases.

The risk of incarceration of hernia in the first year of life is approximately 30%, and those who become incarcerated have up to a 30% risk of testicular atrophy. In this study, 2 cases of incarcerations were present one on each side (5%) in 2 years and 5 years old children; they were treated by an emergency exploration and repair, since the

attempts at reduction had failed. There was no case of strangulation or gonadal infarction. Rowe et al<sup>16</sup> recommended elective surgery after reduction, since it has a lower rate of complication compared to emergency surgery (1.7 Vs 22.1%). But in the present study, no operative or post operative morbidity was noticed. The less number of complications in our case series could be attributed to larger number of elective cases and fewer emergencies operated in the study period.

In our study, 38 cases (95%) presented with asymptomatic swelling (95%) and acute presentation (incarceration) was seen in 2 patients (5%). They presented with acute pain, vomiting, fever, swelling and irreducibility. According to the Llyod and Rowe<sup>16</sup>, the incarceration of inguinal hernia was 17% on right side and 7% on left side with over all rates being 12%. Previous studies showed that incarceration was more common on right side.

Thirty eight patients had unilateral pathology and those children were subjected to USG examination. Of those 38 cases, 2 cases (5%) were diagnosed to have CPPV. In this study, contralateral groin was not explored. But for these cases regular follow up was done and no case was found to have contralateral hernia within the follow-up period. Hata S; Takahashi Y et al<sup>17</sup> studied 348 patients with unilateral inguinal hernia. All underwent US examination using a 7.5-MHz linear transducer and a groin with a hydrocele in the inguinal canal on straining was diagnosed as a CPPV and was explored bilaterally through surgery. The US findings were compared with surgical results. In 348 patients, 78 cases (22.4%) were diagnosed by US as patients with a CPPV; these patients underwent bilateral surgery. Seventy-four of 78 cases (94.9%) were confirmed surgically as patients with CPPV, and concluded that a CPPV was detected correctly by US in 74 of 348 patients (21.3%) with clinically diagnosed unilateral inguinal hernias.

Controversy exists for routine C/L exploration in presence of a clinical inguinal hernia. Various modalities to detect C/L hernias have been described, like USG and laparoscopy, but its efficacy and necessity are debatable. Recent 'Inguinal Hernia' guidelines of the Association of Surgeons of the Netherlands<sup>18</sup> recommend that there is no indication for routine contralateral exploration. In this study only the side with an obvious hernia was operated.

In our case series, infants and children below 9 years were operated under General anesthesia. Spinal anesthesia was used for children above 9 years. Recent 'Inguinal Hernia' guidelines of the Association of Surgeons of the Netherlands<sup>18</sup> recommended that the operations be carried out in daycare and that the use of local anesthesia should be considered more often. The treatment of a pediatric inguinal hernia is always operative. The operation has to be performed more urgent if the child is young, because of the increased risk of incarceration in infants, particularly in case of premature babies. There is no indication for routine exploration of the contralateral groin.

Herniotomy was done for all the cases of hernia except for one case where the internal ring was wide and repair of the transversalis fascia was done with silk 000. Ferguson's technique was used in our study, where external oblique aponeurosis is opened before performing herniotomy. Zamakhshar M<sup>19</sup> proposed that longer wait times were associated with an increased risk of hernia incarceration and more visits to the emergency department among infants and young children waiting for surgical repair of an inguinal hernia. Waiting for surgery for more than 14 days doubled the risk for incarceration.

In the study by Kokorowski et al<sup>20</sup>, the pooled incidence of metachronous contralateral hernia (MCH) after unilateral inguinal hernia repair was 7.3%. A CPPV was found in about 30% of patients if the contralateral side was evaluated with laparoscopy or ultrasound. Although contralateral repair in patients with CPPV may reduce the incidence of MCH, such a strategy will result in significant overtreatment since a majority of these patients will not develop clinical MCH.

Early postoperative complications which were commonly encountered include wound hematoma due to lack of meticulous hemostasis, wound infection, stitch granuloma, stitch abscess. In the present study, 2 (5%) cases of wound hematoma, 1 (2.5%) case of wound infection were encountered. Total complication rate was 7.5% which is higher than other studies like Carneiro<sup>22</sup> (4.5%), Sigmund Ein<sup>23</sup> (1.2%) and Lawrence Moss<sup>23</sup> (2.3%).

Late post operative complications that occur after inguinal hernia repair in children include testicular atrophy, injury to the vas deferens and iatrogenic cryptorchidism. Testicular atrophy occurs in 1% to 2% and decreased testicular size in 2.7% to 13% of patients. Iatrogenic cryptorchidism occurs in 0.6% to 2.9% of patients. Open exploration was also associated with an increased risk of infertility<sup>24</sup>. No such complications were encountered in this study owing to its shorter follow up period.

Benjamin Zendejas et al<sup>25</sup> from their study reported that 3.2% of children who underwent surgery for inguinal hernia repair suffered chronic groin pain that interfered only mildly with daily living and work-related activities for the majority. Though the present study had limitation in its long term follow up, none of the operated cases had chronic groin pain.

Recurrent inguinal hernias are relatively uncommon. However, an incidence of 1% to 2% is reported in the literature. The recurrence may be associated with co-morbid conditions including increased abdominal pressure, prematurity, malnutrition, anemia, and connective tissue disorders. Other causes of recurrence include a missed sac and injury to the floor of the inguinal canal resulting in a direct hernia. There was no recurrence during the period of 2 year study and follow up for a period of 12 weeks to 52 weeks in 40 children. Our study has its own limitations in the form of less number of subjects and shorter follow-up period.

### CONCLUSION:

Congenital hernia is the commonest inguinoscrotal swelling seen in the pediatric age group. Males are more affected than females. Incidence is more common on right side. Open herniotomy is the choice of operation in case of congenital hernia. Looking for patency in case of encysted hydrocele or congenital hydrocele is a must to prevent recurrence. Presence of contralateral patent processus vaginalis on USG doesn't necessitate routine contralateral groin exploration. Emergency herniotomy is not associated with increased intra-operative or post-operative complications.

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