

## Original Research Article

# A study of inguinal hernia in children

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### ABSTRACT

**Background:** Inguinoscrotal swellings are one of the commonest anomalies in infancy and childhood throughout the world. Delay in diagnosis and treatment leads to loss of testis, ovaries or portion of bowel to incarceration or strangulation. This study was undertaken to evaluate the age, sex and sideways distribution and the complications like incarceration, strangulation and gonadal infarction.

**Methods:** A total of 50 children were selected ranging in age from new born to 12 years presenting with inguinoscrotal swelling which were examined, followed up and managed.

**Results:** The inguinal hernia was most common among male children (92%) thereby giving a ratio of M: F=11.5:1. The children were aged new born -12 years and most of the patients presented around 2 to 7(46%) years and prematurity noticed in 10% of cases. Right sided (64%) inguinal hernia was more common than left (28%). In this study indirect hernia is 98% and direct is 2%. In 16 cases of hydrocele, 10 were on the left side and 6 were on the right and 6 cases were encysted hydrocele. High ligation at the level of deep ring was done in all the cases. In this series of 50 children, there were 2 cases of incarceration. But none had strangulation and gonadal infarction.

**Conclusions:** Inguinal hernia is a common surgical condition in children. Elective surgery is associated with minimal complications. Incarceration is more common in infancy with chances of recurrence if explored in emergency.

**Keywords:** Hydrocele, Hernia, Inguinal hernia, Incarceration, Strangulation

### INTRODUCTION

Inguino-scrotal swellings are one of the commonest anomalies in paediatric age groups.

Most of them are related to the abnormalities of descent of testis and failure of obliteration of processus vaginalis.<sup>1</sup> It can be defined as a “protrusion of a viscus or part of a viscus through a normal or an abnormal opening in the wall of its containing cavity.”<sup>2</sup>

Among these, the most common congenital anomalies are inguinal hernia and hydrocele. The incidence of inguinal hernia is even higher in preterm babies. Because of

improvement of intensive neonatal care in last few decades, the survival of premature babies is increasing and it has indirectly increased the incidence of inguinal hernia and hydrocele in paediatric age group. Inguinal hernia in paediatric age group is mostly diagnosed by paediatrician and paediatric surgeons on the basis of history (given by the parents) and clinical examination of the child. Investigations are mainly done to rule out the associated anomalies. Once the diagnosis is confirmed, surgical closure of patent processus vaginalis (inguinal herniotomy) is the most common treatment in paediatric age group.

This study was aimed to know the age, sex and side prevalence of inguinal Hernia in children, to know the

clinical presentation of inguinal Hernia in children age ranged from new born to 12 years, preoperative sonographic evaluation of contralateral processes vaginalis in children with unilateral hernia, management of inguinal Hernia in children and post operative pain management, assessment of bilaterality, association with Hydrocele, cryptorchidism and intersex.

## METHODS

The present study is a prospective hospital based study in the department of surgery, DMCH Darbhanga during the period from September 2014 to December 2015. All children age ranged new born to 12 years with inguinal hernia who attended surgical OPD were selected for the study. Total numbers of inguinal hernia were 50. Congenital inguinal hernia was diagnosed by taking detailed history from parents in the form of site, size, variability of size, history of non-reducibility or presence or absence of testis in scrotal sac, were collected in a prescribed proforma which contains history, clinical examination, investigation and management.

After obtaining the history, children were examined systematically which includes examination of inguinal and groin region, scrotum and its contents, respiratory system, cardiovascular system and per abdomen to know other associated congenital anomalies like undescended testis and other connective tissue disorder.

Children were subjected to routine investigations. Children with unilateral inguinal hernia underwent US examination using a 7.5-MHz linear transducer. If a CPPV was visible as a hydrocele owing to the inflow of physiologic ascites into a processus vaginalis on straining, then US scanning were performed while the patient was at rest and while inducing straining by standing or crying. A groin with a hydrocele in the inguinal canal on straining was diagnosed as a CPPV and cases were followed for 1 year to know development of C/L hernia.

Female children with hernia were evaluated for inter sex problems in the form of ultrasonography of abdomen and buccal Barr bodies.

After proper evaluation of preoperative condition and appropriate preparation, surgery is considered. Surgery is decided by age. If the children <1 year of age, Mitchell banks operation is selected where in herniotomy done without opening the external oblique aponeurosis.

If the children >1 year of age, Fergusson technique is selected where in herniotomy done after opening the external oblique aponeurosis. Post-operative complications were being taken care off. Observed for 6 hours and finally decided to discharge once patient is fit for discharge on the same day. All patients were asked to attend the Surgical OPD for follow-ups.

## RESULTS

In the present study following observation were made.

### Age distribution

The age of the patients ranged from new born to 12 year. They were divided into 12 groups, each with a gap of 1 year. The maximum numbers of cases were in the age group of 2-3 year (16 %) and the minimum number was in the age group 9-10 year. 46% of cases were between 2 to 7 years.

### Prematurity

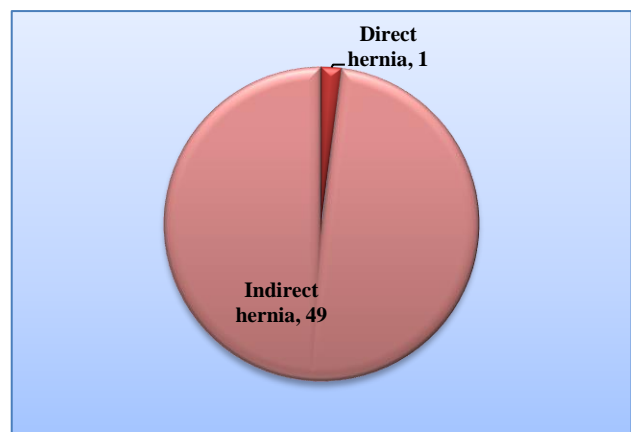
In this study, following table showed the percentage of prematurity with inguinal hernia. 6 babies are born before 28 weeks of gestation in this study.

### Sex distribution

In this study of 50 children, 46 were males and 4 were females, the ratio being 11.5:1

### Side distributions

Among these 50 cases, 32(64%) cases were on the right side, 14(28%) cases on the left side and 4(8%) cases were bilateral. Of those 32 cases on the right side, 28 were boys and 4 were girls. Among the 14 cases on the left side and 4 bilateral, all were boys.



**Figure 1: Direct and indirect component.**

In the present series of 50 cases, 30 swellings were first noticed by their mothers, 15 by grandmother, and 2 by father and in 3 cases it was noticed by doctors during routine checkup for immunization.

In the present study the duration of symptoms, from 1 month to 1 year is seen in 23 patients (46%) and next from 1 year to 5 years in 20 patients (40%).

In 98% of cases, there were indirect hernias (Figure 1).

### ***Associated congenital anomalies***

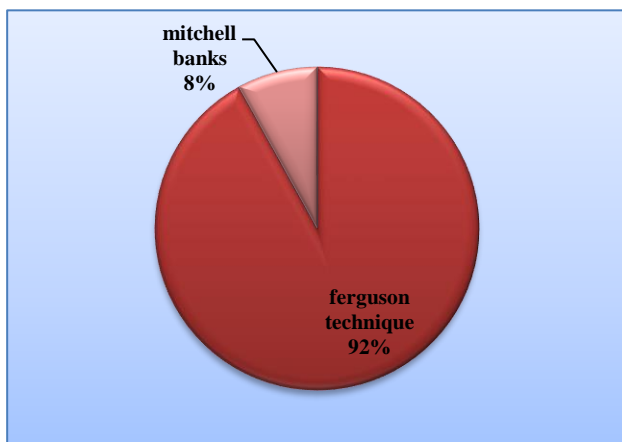
In this series, there were 16 cases of hydroceles of which 10 were on the right side and 6 on the left side. Among these 6 cases were encysted hydrocele of the cord, 3 were on the left side and 3 on the right side. There were 2 cases of undescended testis. All were on the right side and located in the inguinal pouch. They underwent orchidopexy at the time of hernia repair and the testis was placed in the sub dartos pouch. 1 case was associated with Hypospadias. Association with intersex was not observed in present study.

### ***Preoperative sonographic evaluation of CPPV***

In present study 46 patients (42 boys and 4 girls) with unilateral inguinal hernia underwent Ultrasound examination using a 7.5 MHz linear transducer. In 46 cases 4 cases (8%) were diagnosed by US as CPPV. Out 4 cases 3 were on right side, 1 one left and all were boys, and all are below 2 years. 1 case developed C/L inguinal hernia on right side after 6 months.

### ***Operations performed***

In 92% of cases Ferguson technique was done (Figure 2).



**Figure 2: Operative technique for herniotomy.**

## **DISCUSSION**

Inguinal and Scrotal swellings in children form a majority of surgical conditions requiring treatment. Inguinal hernia repair is the most frequently performed operations in the paediatric age group. In controlled population-based studies, there are between 10 and 20 inguinal hernias per 1000 live births. In the present study of 50 cases, the youngest patient was 2 month of age and oldest was 12 years old. 46% of cases were between 2 to 7 years. In Okuribido et al study, maximum number of children were of 3 to 7 years with a percentage of 47.4%.<sup>3</sup> In Adesunkanmi AR et al study, 71% were of 5 years and below.<sup>4</sup> In Wright JE5 study, less than 7 years were of 87%. The figures in the present study are less compared

with other studies mentioned. This is may be due to parental disagreement for surgery in infants.

Regarding prematurity, present study had 12 % of premature baby. In Rescorla and Grosfeld 6 study, 30% were preterm. In Davis N. et al7 study, 35% were preterm. The figures in the present study do not correlate with other studies mentioned. This may due to increased mortality of preterm babies at our hospital or lack of educated parents or they do not know the history of prematurity.

### ***Sex distribution***

In all the studies of inguinal hernia in children, there is male preponderance. Female cases were evaluated for intersex. USG was done to rule out intersex, we have not found case of intersex. In present study, male/female ratio was 11.5:1. In Ralph M Larsen et al8, ratio was 11:1. In Willia B Keisewetter 9 and Marc I Rowe10, ratios were 6:1 and 7:1 respectively. The figures in the present study correlates well with other studies mentioned.

### ***Side distribution***

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. B/L cases were evaluated for intersex and connective tissue disorder but were not associated. In present study, 64% of cases with right preponderance. In Rowe and Grosfeld et al study, 60% were of right preponderance.<sup>10</sup> The percentage of right predominance in Michel Gilbert et al 11 and Muhammad T. et al 12 study were 63.5% and 60% respectively.

### ***First person to notice the swelling***

In the present series of 50 cases, 47 swellings were first noticed by their parents and in 3 cases it was noticed by doctors during routine checkup for immunization. Parents are usually the first person to notice the swelling and this has been documented in earlier studies (Scherer L.R and Grosfeld JL they noticed, in 99% of the cases, hernia was diagnosed by the parents for the first time).<sup>6</sup>

### ***Duration of symptoms***

In the present study the duration of symptoms, from 1 month to 1 year is seen in 23 patients (46%) and next from 1 year to 5 years in 20 patients (40%) The delay in recognizing the swelling in inguinal region is size. Size may be small where patients / parents could not able to pick up or the surgeon is unable to confirm its presence.

### ***Symptomatology***

According to Llyod and Rowe, most of the hernias are asymptomatic swelling and acute presentation seen in 12% of children. In our study most of the patients

presented with asymptomatic swelling (96%) and acute presentation seen in 2 patients (4%). They presented with acute pain, vomiting, fever, swelling and irreducibility. In our study cases of incarceration seen on the right side with 4% and overall rate being 4% this showed that incarceration is more common on right side. Incidence of incarceration is low in our study this may be due to early diagnosis and most of the surgeons do not hesitate to operate on infants as early as possible due to availability of newer anaesthesia and better NICU care.

### ***Direct and indirect component***

Direct inguinal hernias in children are rare and represent 0.5% to 1% of all groin hernias. In our study 1(2%) case was found to have direct hernia for which posterior wall repair was done. In Wright JE<sup>5</sup> and Gorsler and Schier.<sup>13</sup> study, percentages of direct hernia were 1.2% and 3.9% respectively.

### ***Associated congenital anomalies***

#### ***Undescended testis***

During the course of this study, 2(4%) cases of undescended testis were detected, all of them were on the right side and situated in the superficial inguinal pouch. These patients had orchidopexy at the time of hernia repair and testis was placed in the subdartos pouch. Similar findings were found in Javad Ghoroubi et al<sup>14</sup> (5.85%) and Duckett J.W. et al.<sup>15</sup> (4%).

#### ***Encysted hydrocele of the cord***

There were 6 cases of encysted hydrocele of the cord, 3 on the left side and 3 on the right. All had PPV. This study is in accordance with Duckett J.W et al<sup>15</sup> who conducted 380 hernia operations and found 25 hydroceles of the cord.

#### ***Congenital hydrocele***

In this series, there were 16(32%) cases of congenital hydroceles. In Hugh B. Lynn<sup>16</sup> study, 17% of cases had congenital hydroceles.

#### ***Hypospadias***

Out of 50 cases in this study, association of hypospadias was observed in 1(2%) case.

### ***Preoperative sonographic evaluation for CPPV***

In present study 46 patients with unilateral inguinal hernia underwent US examination. In 46 cases 4 cases (8%) were diagnosed as CPPV. Out 4 cases 3 were on right side, 1 one left and all were boys and were within 2 years. Since our study is observational and there is chance of spontaneous closure within 2 year, we have not explored contralateral side and no comparison was done

with operative findings. But for these cases regular follow up was done and found that 1 case developed C/L inguinal hernia on right side after 6 months.

### ***Operation performed***

Recent 'Inguinal Hernia' guidelines of the Association of Surgeon of the Netherlands<sup>17</sup> recommended that the operations be carried out in day care and that the use of local anaesthesia should be considered more often. The diagnosis of inguinal hernia is based on the physical examination. It is recommended that the surgeon should not rely solely on the history but confirm the presence of a hernia personally. The treatment of a paediatric inguinal hernia is always operative. Generally, younger the child, the more urgent the operation, because of the increased risk of incarceration in infants, particularly premature babies. There is no indication for routine exploration of the contralateral groin. If an incarcerated hernia cannot be reduced, emergency operation is necessary and referral to a paediatric surgical centre must be considered.

Routine hernia repairs are performed on day care basis. In this study all the cases were confirmed by physical examination, were asked to come on day of surgery. All the cases were treated by operation. Younger children and infants particularly premature babies were operated at earliest date available. 92% of the cases were treated by Fergusson procedure as 46 children were >1year of age and 8% treated with Mitchell banks procedure for 4 children were <1year of age under appropriate anaesthesia. For all cases, high ligation of sac was done. There was no operative or post-operative morbidity or mortality related to congenital hernia surgery in this series. In those 2 cases which were operated as emergency, the hernia sac was opened to evaluate for incarceration or sliding structures.

All incarcerated hernia treated by elective surgery after reduction. In the present study there were no case of strangulation and gonadal infarction. The less number of complications in this series could be attributed to larger number of elective cases and fewer emergencies that too operated in time.

### ***Duration of hospital stay***

Most operations are performed on an outpatient basis and sent on day of surgery. 3 cases had inadequate pain control and 2 cases had emesis and were kept under observation in the recovery room. 2 cases that were discharged on the day of surgery had emesis and came next day in coma with pin point pupil due to hypoglycaemia.

Patient recovered after infusion of 25% Dextrose. Average duration of stay was 1.2 days. Hernias in children were operated as Day care procedure but in our study 2 cases had hypoglycaemia on next day after

discharge. Generally preterm babies that are below 60 weeks are kept under observation.

### Complication

In the post operative period of 50 children, there were 2 cases of wound infection and 2 cases had hypoglycaemia. No other complications were noted. All of them responded to conservative treatment.

### Recurrence

During the period of 1 and ½ years study and follow up period of 12 weeks to 52 weeks, 3(6%) cases had recurrence. Recurrent inguinal hernias are relatively uncommon. Reports from most children's document an incidence of 1% to 2%. The recurrence may be associated with co morbid conditions including increased abdominal pressure, prematurity, malnutrition, and anaemia 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.

### CONCLUSION

Inguinal hernia is a common cause of congenital inguino-scrotal swelling in paediatric age group. It is more commonly seen in male children and incidence is more common on right side. Though it can develop at any age, even in the neonates, but majority of children develop it between the ages of 1 to 5 years. Incidence is higher in premature and low birth weight neonate. Almost all of the inguinal hernia in paediatric age group is of indirect type, which develops due to congenitally patent processus vaginalis. Once developed, it cannot resolve spontaneously, and so, early surgical intervention in form of inguinal herniotomy is the most appropriate management of inguinal hernia in children. Otherwise, it can lead to the complications like obstruction and strangulation.

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