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SURGICAL MANAGEMENT OF INGUINAL HERNIA IN PEDIATRIC AGE- A CASE CONTROL OBSERVATIONAL STUDY

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ABSTRACT:

Background: Inguino-scrotal swellings are one of the commonest anomalies in pediatric age group. Among these, the most common congenital anomalies are inguinal hernia and Hydrocele. The incidence of inguinal hernia is even higher in preterm babies.

Objectives: This prospective study was conducted to evaluate the different surgical techniques in the management of inguinal hernias.

Methods: A prospective case control analysis was performed on the hospital records including operative notes of 160 admitted pediatric patients, aged from 0 to 12 years, who had inguinal hernia.

Results: A total of 160 patients of age between 0-12 years age group were recruited into the study including 126 male and 34 female patients were included in the final analysis. We divided 160 patients in three groups i.e. 0-3, 3-7 and 7-12 years. Number of patients were (43) 26.0% of the cases, 3 to 7 years which compromise (67) 42.75% and 7 to 12 years which compromise (50) 31.25%. Most common age of inguinal hernia was between 3-7 years. The right inguinal hernia is more than left in both genders. The most common anomaly was undecsended testis found in 7 patients. The rate of complications was higher in emergency cases i.e. 55% and in elective cases 16.25% increasing. More complications found in 20 (12.5%) male patients, 6 (3.75%) females and male: female ratio 3.3:1. Superficial infection i.e. 24(15%) was more common than deep infection. Recurrence was very less noticed i.e. in 3.3% patients.

Conclusion: Early detection and repair of inguinal hernia in pediatric patients is essential to decrease the potential morbidity and operative complications.

Keywords: Epigastric hernia, inguinal hernia, Umbilical hernia, Herniotomy, Processus vaginalis, Strangulation.

Introduction

A hernia is the protrusion of an organ, such as the bowel, through the wall of the cavity in which it normally resides.[1] Paediatric hernias are common developmental abnormalities which have different management from their adult equivalents. Conducting research in the management of paediatric hernias is challenging because of ethical considerations and variations in treatment practice. There are three common types of paediatric hernia i.e. Umbilical hernia, Epigastric hernia and inguinal hernia.[1,2,3]

Umbilical hernia

Umbilical hernias present as a reducible, painless bulge at the umbilicus. They usually become more prominent when the patient strains or cries. Parents might present with anxiety about the appearance of a lump when their child is upset or unwell. Distress and crying cause an umbilical hernia to protrude more because of increased intra-abdominal pressure. If the hernia is still reducible this does not indicate a complication. Incarceration occurs when abdominal viscera or omentum become stuck within the hernia. Strangulation occurs when viscera become stuck in the hernia with compromise to their blood supply, causing ischemia. Children with incarcerated hernias present with painful irreducible lumps that can change color and when strangulated are associated with vomiting or constipation. [1,2,3]

Epigastric hernia

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Epigastric hernias occur in the midline, anywhere from the xiphoid process to the umbilicus, and most contain preperitoneal fat. The underlying pathology is controversial; theories include failure of complete fusion of abdominal wall muscle fibers at the linea alba or defects at the sites of blood vessel penetration.[17,18] It has also been proposed that diaphragmatic attachment places more tension on the Epigastric region leading to a weakness in this area. Children present with a mass in the epigastrium, which commonly enlarges and is associated with abdominal wall pain or tenderness. Nearly 10% of Epigastric hernias have multiple defects, which present as multiple lumps in the midline. Additionally, many younger patients find that their hernias rub against clothes, leading to pain and irritation of the skin. The true prevalence of Epigastric hernia is therefore unknown. In a small observational study from the US, Epigastric hernias accounted for 4% of all paediatric abdominal wall hernia referrals. [1,2,3,16]

Inguinal hernia

Inguino-scrotal swellings are one of the commonest anomalies in pediatric age groups. Most of them are related to the abnormalities of descent of testis and failure of obliteration of Processus vaginalis. 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 the advancement of treatment for infertility and of improvement of intensive neonatal care in last few decades, the survival of premature babies is increasing and as a result, it has indirectly increased the incidence of inguinal hernia and Hydrocele in pediatric age group. 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 pediatric age group. Some surgeons favor the repair of inguinal hernia in pediatric age group by laparoscopic procedure, especially for bilateral cases. This study is intended to find out the relation of various factors like age, sex, side, maturity etc. with inguinal hernia in children, and also to find out the associated anomalies and outcome of surgical intervention in pediatric patients with inguinal hernia in our hospital. Inguinal hernias occur in 0.8% to 5% of full term infants.[1,2,3,18]

The Processus vaginalis lengthens through the inguinal canal from the third to the seventh month in utero, and allows the testes to descend into the scrotum. The Processus vaginalis gradually obliterates at weeks 36-40 with just the distal portion persisting as the tunica vaginalis. Failure of closure of the Processus vaginalis is a common mechanism in the pathogenesis of inguinal hernia and Hydrocele in children. This enables intra-abdominal contents to herniate through the deep inguinal ring, inguinal canal, and superficial inguinal ring into the scrotum or via the canal of Nuck into the labium. The left Processus vaginalis obliterates before the right; this is thought to explain why right sided inguinal hernias outnumber left sided and bilateral hernias in a ratio of 7:2:1.[20,21]

A hernia usually presents as a bulge in the groin, although in boys it can present as a swelling within the scrotum, which is often only visible upon straining or crying. A Hydrocele can also present as a swelling in the scrotum. Incarcerated or strangulated hernias attempts are made to reduce the hernia in patients presenting with signs of incarceration; this is successful in 97-99.1% of cases. Fifteen per cent of reduced incarcerated hernias will re-incarcerate within five days if not repaired, so discuss any patient presenting with incarceration or strangulation with the on-call paediatric surgical team, who will assess how quickly the hernia needs to be repaired. Asymptomatic inguinal hernias in neonates are operated on before discharge from the maternity unit. Children less than 6 months old are operated on the next available list and older children as an elective case. Both laparoscopic and open repairs are offered, depending on local circumstances and resources. Open Herniotomy is performed through a small groin incision. After identifying the cord structures, they are carefully separated from the hernial sac. The sac is ligated proximally and any distal Hydrocele suctioned before closure. Ultrasonography can be used routinely in the preoperative diagnosis of inguinal hernia in

children. PPV values higher than 4 mm, indicate hernia with a high accuracy rate.[4,7,20]

These questions will remain unanswered until there is a well designed, long term prospective randomized control trial. This prospective study was conducted to evaluate the different surgical techniques in the management of inguinal hernias.

METHODS

This study was conducted in the Department of General Surgery, Government Medical College, Latur, Maharashtra; depending on the hospital records including operative notes of pediatric patients admitted in October 2016 to October 2018. Data was collected including name, age, gender, side of hernia, type of presentation, associated anomalies like other hernia, undecsended testes or Hydrocele.

A prospective case control analysis was performed on the hospital records including operative notes of admitted pediatric patients, aged from 0 to 12 years, who had inguinal hernia. On observation, male affect more than female, right side inguinal hernia more common than left due to left decent of testis on right side. Early detection and repair of inguinal hernia in pediatric is essential to decrease the potential morbidity and operative complications rate. This needs an increase in popular and pediatric awareness.

Inclusion criteria: Patient with inguinal hernia aging from two years till the age of ten years. The *Exclusion criteria:* Associated Epigastric or umbilical hernia, Omphalitis, Recurrent hernias, Irreducible, obstructed and strangulated hernia.

Preoperative investigations included: Complete blood picture and bleeding profile.

Surgical procedure: Hernial sac was identified, dissected, the proximal part was transfixed at the level of internal ring with absorbable suture and excised, repair of weak floor with absorbable sutures done in some cases. The external oblique aponeurosis and the subcutaneous fatty tissue was then closed in two layers, skin was closed by sub cuticle method with absorbable suture vicryl 3-0 cutting needle. The content of the hernia sacs, associated conditions noted pre and per-operatively. There were some associated pathologies like Hydrocele, undecsended testis, pharoses, umbilical hernia excluded from study. Post operative transient scrotal swelling which was not mentioned because they are not seen in female patients. Post operative complications including scrotal swelling, superficial wound infection, deep collection, fever, and recurrence were recorded during the subsequent follow up of 0-3 months.

RESULTS

A total of 160 patients of age between 0-12 years age group were recruited into the study including 126 male and 34 female patients were included in the final analysis. We divided our patients in three groups according to their ages: less than 3 years which compromise (43) 26.0% of the cases, 3 to 7 years which compromise (67) 42.75% and 7 to 12 years which compromise (50) 31.25%. Most common age of inguinal hernia was between 3-7 years. (Table 1)

Most of the patients 62.56% have right sided inguinal hernias, 29.32% have left sided and 8.12% have bilateral inguinal hernia seen. The right inguinal hernia is more than left in both genders. The most common anomaly was undecsended testis found in 7 patients. (Table 1)

In relation to patient's presentation, the rate of complications was 16.25% in elective cases, increasing too much to reach 55% of the emergency cases, the operating time for emergency cases more compare to elective cases. (Table 2) In relation to the sex of the patients, the total numbers of complicated group are 20 (12.5%) male patients, 6 (3.75%) females and male: female ratio 3.3:1. Superficial infection i.e. 24(15%) was more common than deep infection. Recurrence was very less noticed i.e. in 3.3% patients. (Table 3)

Table 1: Distribution of case according to variables.

Variables		Male		Female		Total	
		No	**%**	**No**	**%**	**No**	**%**
Age (years)	**0-3**	35	21.8	8	5.0	43	26.8
	3-7	55	34.3	12	7.5	67	41.87
	7-12	46	28.9	4	2.5	50	31.25
	Total	136	85.0	24	15	160	100
Site of hernia	**Right**	81	50.6	19	11.9	100	62.56
	Left	42	26.2	5	3.12	47	29.32
	Bilateral	13	8.12	0	0	13	8.12
	Total	136	85.0	24	15.0	160	100
Type of surgery	**Elective**	126	78.75	18	11.25	144	90.0
	Emergency	10	6.25	6	3.75	16	10.0
	Total	136	85.0	24	15.0	160	100
Associated anomalies	**Undecsended testis**	7	4.37	0	0	7	4.37
	Umbilical hernia	6	3.75	3	1.87	9	5.62
	Hypospadias	5	3.12	2	1.25	7	4.37
	Vesicle calculus	4	2.5	0	0	4	2.5

Table 2: Complications in elective and emergency operation.

Post operative complications	Elective Group		Emergency Group		Total	
	No	**%**	**No**	**%**	**No**	**%**
Non complicated	124	77.5	10	6.25	134	83.75
Complicated	20	12.5	6	3.75	26	16.25
Total	144	90.0	16	10.0	160	100

Table 3: Post operative complications in relation to the gender.

Post operative complications		Male		Female		Total	
		No	%	No	%	No	%
Non complicated		112	70.0	12	11.25	124	77.5
Complicated	Superficial infection	18	11.25	5	3.12	23	14.37
	Deep infection	8	5.0	1	0.61	9	5.61
	Recurrence	4	2.5	0	0.0	4	2.5
Total		142	85.62	18	14.37	160	100

DISCUSSION

The inguinal hernia is one of the most frequently performed surgical procedures in pediatric patients. It does not resolve spontaneously and must be repaired because of high risk of strangulation or incarceration. A prospective case control analysis was performed on the hospital records including operative notes of admitted pediatric patients, aged between 0 to 12 years, who had inguinal hernia. On observation, male affect more than female, right side inguinal hernia more common than left due to left decent of testis on right side.

Following observations were made in the present study-

Age distribution: This study included patients from newborns to 12 years of age, which were divided in four categories on the basis of their

age: Less than 0-3 year, 3 to 7 years and 7 to12 years. Maximum incidence was seen in 3-7 years age group (41.87%). The youngest baby in this study was one month old. Regarding age distribution, which shows that the majority of inguinal hernias appears early in life, the fact that should raise the attention of people, parents, pediatrician and surgeon about this common and easily managed condition if treated at earlier time i.e. before obstruction, strangulation or incarceration. Only eight female patients were reported hernia in up to 3 years age group, 12(7.5%) patients in 3-7 years group and 4(2.5%) patients in 7-12 year age group, which may explain on the social background of our people that wouldn't present their female earlier. From 24(15%) cases of female inguinal hernia, there were 4 (33%) of them containing ovary and fallopian tube in the hernial sac, that's why we must take the hernias in females seriously and should be treated by an early to prevent the subsequent complications like thrombosis and gangrene and during operation be careful not to injure it.

Our observations were matching with the observations of Ravikumar et al[2] and Jadhav et al, [3] who have reported an incidence of 52% and 44%, respectively, in 1-5 years age group in their studies. Okuribido et al[4] have reported an incidence of 47.4% in children from 3 to 7 years of age. Bronsther[5] et al have reported that one third of patients of their series were of less than 6 months of age.

Most of the patients 62.56% have right sided inguinal hernias, 29.32% have left sided and 8.12% have bilateral inguinal hernia seen. The right inguinal hernia is more than left in both genders. The most common anomaly was undecsended testis found in 7 patients. (Table 1)

In relation to patient's presentation, the rate of complications was 16.25% in elective cases, increasing too much to reach 55% of the emergency cases, the operating time for emergency cases more compare to elective cases. (Table 2) In relation to the sex of the patients, the total numbers of complicated group are 20 (12.5%) male patients, 6 (3.75%) females and male: female ratio 3.3:1. Superficial infection i.e. 24(15%) was more common than deep infection. Recurrence was very less noticed i.e. in 3.3% patients. (Table 3)

Gender distribution: 136 children were males and 24 children were females, thus making a male to female ratio of 8.5:1.5. In other studies, male to female ratio ranged from 7:1 to 11.5:1. It was reported as 7:1 by Grossfeld et al,[6] 6:1 by Poenarau,[7] 9:1 by Ravikumar et al[2] and 11.5:1 by Jadhav et al.[3]

Side distribution: In this study, we found a higher incidence of inguinal hernia on right side (62.56%). 29.32% hernia were left sided and 8.12 % were bilateral. Our observations matched with the observations of Jadhav et al[3] and Ravikumar et al[2] who have reported an incidence of 64% and 56% for right sided inguinal hernia in their studies, respectively. Similarly, Rowe et al[10] and Grossfeld et al[6] have also reported a higher incidence of inguinal hernia on right side.

Associated anomalies: The commonest associated anomaly found in our study was undecsended testis, which was seen in 7 patients (4.37%). Out of these, in two cases, testes were present in superficial inguinal pouch, while in one case, it was in inguinal canal. Orchiopexy was performed in all cases along with inguinal Herniotomy. Scorer et al[12] found that incidence of undecsended testis was 30.3% and 3.4% in preterm and full term newborn babies, respectively. According to Witherington et al, [13] a patent Processus vaginalis with undecsended testis is a clear indication for orchiopexy. A reducible umbilical hernia was present along with inguinal hernia in 9 cases (5.62%) of our series. No surgical intervention was done for it, as all of them were of less than three years of age at the time of surgical repair of inguinal hernia. Seven patients (4.37%) of our series had distal penile hypospadias and 4(2.5%) patients had vesicle calculus. Surgical correction was performed along with the surgery for inguinal hernia. In our study, 7 female patients with inguinal hernia were additionally studied by USG abdomen to rule out intersex condition. No abnormality was found in any of the female patients. Five patients (3.12%) of our series had presented with incarcerated hernia, with the features of intestinal obstruction.

After performing the manual reduction successfully, surgical repair of hernia was done after 48 hours. Rowe et al[10] have also recommended elective surgery after reduction in such cases. Elective surgery complications 20(12.5%) were lower than the emergency surgery 6(3.75%). We did not find any case of direct hernia in our study. Direct inguinal hernia are rare in pediatric age group and they represent only 0.5% of all groin hernia.[14,15] Sliding hernia are uncommon in children, more commonly seen in female babies. One male patient in our series had right sided sliding hernia which was containing cecum inside it. Grossfeld et al[6] had found ovaries and fallopian tubes in 15% of hernias in girls in one series. Six patients (8.12%) of our series had presented with bilateral hernia, which were operated in same surgery.

Post-operative complications were found in 36 patients; 23(14.37%) who developed the complication of superficial wound infection, 9(5.61%) were having deep infection, which were successfully treated with antibiotics. The follow-up period in our study ranged from 3 months to 1 year. Four recurrences were reported during this period, which was kept for resurgery.

CONCLUSION

Inguinal hernia is a common cause of congenital inguino-scrotal swelling in pediatric 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 age of 0 to 7 years. Incidence was higher in premature and low birth weight neonate. Almost all of the inguinal hernia in pediatric age group was of indirect type, which developed due to congenitally patent Processus vaginalis. Once developed, it could not resolve spontaneously, and so, early surgical intervention in the form of inguinal Herniotomy was found to be the most appropriate management of inguinal hernia in children. Hence early detection and repair of inguinal hernia in pediatric patients is essential to decrease the potential morbidity and operative complications. This needs an increase in population, pediatrician, parents, and surgeon awareness.

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