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Original Research Article

Management and outcome of pediatric inguinal hernias with emphasis on technique without opening the inguinal canal- a single center experience

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ABSTRACT

Background: Herniotomy for congenital inguinal hernia in children is a fairly common surgical procedure. Inguinal hernias in infants can be repaired by conventional surgery as well as laparoscopic approach. Open repair of inguinal hernias in children without opening the inguinal canal, thereby maintaining the normal anatomy was done at our centre. Objective was to evaluate the course and outcome of paediatric congenital inguinal hernia cases operated at our centre.
Methods: This study was conducted in a service hospital (Military Hospital Jammu), on 67 patients presenting with congenital inguinal hernia during October 2014 to June 2017.
Results: Sixty-two children were male and five were female. 18 were less than one year, 38 between two to five year and 11 more than five years. All the patients were evaluated preoperatively and taken up for surgery under general anesthesia (n=18) spinal block (n=36) and caudal anesthesia (n=13). Approximate length of skin incision was 1.5 to 2.0 cm. External inguinal ring was opened in 3 cases only. Approximate postoperative stay in hospital was 1-2 days. Nine patients had reactive hydrocele and one patient developed surgical site infection (SSI). On 12 months post-operative follow up, none of the patients had any further complications.
Conclusions: Inguinal hernias are common in children, with increased risk of incarceration if not repaired early. Open technique without altering the inguinal canal anatomy is also a suitable alternative to congenital inguinal hernia repair in children with favourable comparable outcome.

Keywords: Congenital inguinal hernia, Herniotomy, Inguinal canal, Open repair for inguinal hernia

INTRODUCTION

Herniotomy in infants for congenital inguinal hernias is a routine surgical procedure. It is a fairly simple surgery with favourable outcome with minimal complications.[1,2] The incidence of congenital hernias is approximately 3% to 5% in term infants and 13% in preterm infants less than 33 weeks of gestational.[3] Inguinal hernia in both term and preterm infants need to be repaired soon after diagnosis to avoid its complications like incarceration or strangulation. In present era of minimally invasive surgery, laparoscopic repair of congenital hernia in infants are safe, feasible and provides anatomical view of structures without disturbance to the vas. The contralateral anatomy can also be examined for any evolving hernia which can also be managed during the same procedure. The recurrence rate for laparoscopic repair is similar to conventional open approach with favourable outcome.[4] Herniotomy being a mainstay of therapy wherein identification of sac and its subsequent repair provides lesser recurrence, any modality of treatment must be duly justified in terms of cost

effectiveness and expertise available. Due to the paucity of data in literature, the optimal timing for hernia repair in infants remains debatable. This study reviews the embryology, natural history of congenital inguinal hernias and analyzes its management by technique without opening the inguinal canal or external oblique aponeurosis.

METHODS

This prospective observational study was conducted from October 2014 to June 2017, at a service hospital (Military Hospital Jammu). 67 patients presenting with congenital inguinal hernia were included in the study. The study was approved by institutional ethical committee.

Inclusion criteria

Patients of age group of newborn to 10 years with clinical diagnosis of congenital inguinal hernia were included in the study.

Exclusion criteria

Subjects with acute conditions like strangulation, incarceration, obstructed hernia and associated abdominal pathologies or congenital anomalies were excluded from the study after informed consent. Diagnosis was based on history of swelling in inguinal region, intermittent bulge on crying along with clinical examination confirming presence of reducible inguino-scrotal swelling with normal palpable testis on both sides.

Preoperative workup and pre-anesthesia checkup (PAC)

Relevant investigations as per hospital protocol were done. Patients were admitted one day prior and were kept nil orally 6 hours before procedure. Pre op counselling of parents regarding diagnosis, management and post op follow up were done in each case.

Procedure

Patients were taken up for surgery under spinal/caudal/ general anesthesia. Preoperative single dose empirical antibiotic was administered. Inguinal incision corresponding to skin crease was given overlying the external inguinal ring (ascertained on following the cord structures from root of the scrotum towards external inguinal ring). Incision was deepened and cord structures were encased in cremasteric fascial layer. Hernial sac was identified at external ring and was gently separated from cord structures without disturbing the vas, pampiniform plexus and testicular vessels. Dissection of sac was continued 1.5-2.0 cm proximally up to the deep ring without opening the inguinal canal. Patency of processus vaginalis was confirmed and transfixation and division of sac towards deep ring was done. Disappearance of proximal sac towards abdominal cavity confirmed adequacy of hernitomy repair. Distal sac was laid open as far as feasible without disturbing the cord structures. Closure of cremasteric fibres were done with 3-0 or 4-0 monocryl. Fascia scarpa and camper's fascia were also repaired with interrupted sutures. Subcuticular sutures were applied for skin closure followed by application of antiseptic dressings. Early ambulation and discharge on 1st post op day was done. Patients were followed up on outpatient basis after 7 days.

RESULTS

67 patients presenting with congenital inguinal hernia during Oct 2014 to June 2017. Sixty two children were male and five were female. 18 were less than one year, 38 between two to five year and 11 more than five years. 36 children were operated under spinal block, 13 under caudal block and 18 under spinal anesthesia. Hernial sac was opened in only three patients and in remaining 64, was not opened.

Table 1: Age and sex distribution.

Age	Male	female
0-6 months	09	0
7-12 months	09	0
1-2 years	13	01
2-3 years	14	03
3-5 years	07	0
5-10 years	10	01
Total	67	

Table 2: Type of anesthesia given.

Type of anesthesia	Number of patients
Spinal block	36
Caudal block	13
General anesthesia	18

Table 3: Status of superficial inguinal ring and inguinal canal.

Procedure done	Number
Sac opened	03
Sac not opened	64

Table 4: Contents of sac.

Contents	Number
Omentum	65
Appendix	01
Ovaries	01

Table 5: Hospital stay (post surgery).

Days of hospital stay	Number
1 day	62
2-3 days	03
> 3 days	02

Table 6: Post operative complications.

Retention of urine	**02**
Reactive hydrocele	09
Superficial skin infection (SSI)	01

The contents of the hernial sac were omentum (62), appendix (01) and ovaries (01). Regarding post-operative complications soon after delivery, two patients developed retention of urine, nine had reactive hydrocele and one had superficial skin infection. Detailed findings have been elborated in Table 1 to Table 6.

DISCUSSION

Embryology and natural history of patent processus vaginalis and congenital inguinal hernia: The knowledge and study of embryology of descent of testis and formation of processus vaginalis is essential for any surgeon treating the inguinal hernia. Testicular descent occurs in two phases: Intra-abdominal and extra abdominal descent.[5] During intra-abdominal phase, the testicular mass derived from bipotential gonadal tissue at the urogenital ridge is attached to the diaphragm with cranio-suspensory ligament. This ligament plays key role in testicular descent during the intra-abdominal phase, lasting up to 8-15 weeks of gestation. In male fetus the craniosuspensory ligament regresses and allows trans-abdominal migration of testicular mass towards inguinal canal. The thickening of gubernaculum anchoring the testis and resultant caudal pull along with fetal growth and abdominal elongation results in the caudal travel of testis through deep and superficial inguinal rings into the scrotal sac.[6] In females, the craniosuspensory ligament persists. Hence the gonadal mass (ovaries) retains its retrocoelomic intra-abdominal position. Moreover, the gubernaculum does not thicken and remains as ovarian round ligament.

Extra-abdominal phase: Between 25-35 weeks of gestation the testis descends and reaches the scrotal sac.[7] The testicular descent brings down an extension of peritoneal lining, known as processus vaginalis (PV). This out pouching layer of peritoneum obliterates and the part surrounding the testis persists as a sac known as tunica vaginalis. Studies conducted in human invitro tissue culture and rodent models have implicated the genitofemoral nerve to be critical for gubernacular length regulation and obliteration of processus vaginalis.[8-10] Incomplete involution of the peritoneal sac results in patent processus vaginalis (PPV) which thereby acts as a conduit for peritoneal fluid to travel into the tunica vaginalis, resulting in congenital hydrocele. In case the conduit path is large enough allowing herniation of omentum and abdominal contents into the scrotal sac, this results in congenital inguinal hernia. This correlation between processus vaginalis and testicular descent can explain the preponderance of pediatric inguinal hernias in male infants. The delayed involution of right PPV is consistent with the observation that 60 % of indirect inguinal hernias occur on right side.[11] PPV is prevalent in infancy and the incidence declines with age, with complete involution by 18-24 months of age.[9,10] The reported prevalence of PPV is as High as 80% in term male infants.[11] PPV does not necessarily means it will lead to inguinal hernia in children. The estimated childhood risk of developing PPV in later life is 25-30%.[12,13] Considering the small lumen of infant bowel and increased risk of incarceration of bowel, all inguinal hernias in infants should be repaired. Moreover, there are increased likelihood of testicular atrophy and impaired spermatogenesis as a result of altered temperature milieu in case hernias are not repaired in time. There has to be a risk balance strategy wherein the risk of surgery versus risk of potential anesthetic and surgical complications. In an analysis of Canadian administrative database containing more than 1000 children with inguinal hernia, Zamakshary et al showed that children younger than one years had two fold greater risk of inguinal hernia incarceration if repair was performed beyond two weeks of diagnosis compared to those children whose repair was performed between 1-2 years of age.[14] Vaos et al in a study published in 2010 on Optimal timing for hernia repair in premature infants had noted significantly greater risk of inguinal hernia incarceration, post-operative hernia recurrence and testicular atrophy in infants who had repair delayed beyond one week of diagnosis.[15] Luatz et al analyzed the risk of inguinal hernia incarceration in 49000 preterm infants from KIDS database and determined that overall rate of inguinal hernia incarceration was approximately 16% with increasing risk among infants whose surgery was delayed beyond 40 weeks corrected gestational age (21%) compared with 36-39 weeks corrected gestational age (11%) or less than 36 weeks corrected gestational age (11%).[16] Data from other sources indicate a converse that delayed hernia repair is associated with decreased rates of complications. Lee et al reported incarceration of 4.6% in 172 former preterm infants treated at a single centre.[17] Uemura et al in a comparative study had concluded the incarceration rate to be 19% in preterm infants (weight range 492-2401 gm) as compared to 21% in infants undergoing urgent repair was comparable. The various studies have suggested delayed inguinal hernia repair has no adverse effects however data is not as compelling as those suggesting repair on a more urgent basis. Timing of inguinal hernia repair in preterm and term infants represents a balanced risk of incarceration and post-operative respiratory complications. The present literature does not clearly define the extent of risk and measures to balance them. Repair of Inguinal hernia is associated with operative complications such as hernia recurrence, vas deference injuries and testicular atrophy with incidence varying from 1-8%.[18-21] Long term complications may include chronic pain and infertility in adulthood. The early repair of inguinal hernias in preterm infants must be balanced against the risk of post-operative apnea after general anesthesia. Spinal anesthesia is preferred over general anesthesia to overcome these complications. Moreover, studies have suggested emerging evidence that

use of general anesthesia in infants may be associated with neurocognitive impairment, specifically after multiple exposure to general anesthesia before 3 years of age.[22] Herniotomy is a day care procedure but most of patients in our study were admitted one day prior to surgery as per the hospital protocol. Discharge was done on 1st post op day in uneventful cases (n=62). A study done by Ravikumar et al have highlighted that although routine inguinal hernia repairs in children are done on day care basis their study brought out that majority of cases were treated as inpatient and hospitalization period of 1-6 days.[23] In our study the mean length of incision was 1.5 cm. In era of laparoscopic and minimal invasive surgery the incision size has been reduced considerably. Ramanathan et al in their study compared laparoscopic surgery for inguinal hernia with conventional hernia surgery and concluded that 5 mm incision is definitely better than 1.5-2.0 cm incision however the significance of this difference is decimated by the fact that the incision is not visible due to concealment under clothing. Inguinal hernias have a significant prevalence in preterm infants. Hence the costly laparoscopic surgery may not be available or feasible making the conventional surgery as the mainstay for management. Studies showing comparable results also augment the role of conventional surgery in such patients. Ramanathan et al and Chan et al in their respective studies have brought out that conventional surgery has comparable outcome with respect to laparoscopic surgery except for better cosmetic outcome and simultaneous diagnosis and repair of contralateral patent processus vaginalis. But they further suggested that considering low metachronicity in unilateral hernias and relatively less significance of cosmetic outcome in groin region, conventional surgery may continue as the standard of care especially in resource constrained centres.[24,25]

The present study has its limitations. Our study had a smaller sample size. Studies with larger sample size with long term follow up is required to understand the complete picture and benefits of inguinal canal sparing congenital hernia surgical procedures as explained in our study.

CONCLUSION

To conclude, inguinal hernias are common in children, with increased risk of incarceration if not repaired early. Open technique without altering the inguinal canal anatomy is also a suitable alternative to congenital inguinal hernia repair in children with favourable comparable outcome.

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