ORIGINAL ARTICLE

IS IT MANDATORY TO LIGATE SAC IN EMERGENCY HERNIOTOMY IN PAEDIATRIC AGE GROUP? A PROSPECTIVE COHORT

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Background: Herniotomy is standard treatment for inguinal hernia in children. Paediatric surgeons remain divided on whether ligation of sac is mandatory. In our study, we left the sac open to see early recurrence. **Methods**: This quasi=experimental study, done in emergency cases, was sequel to our previous study done in elective cases. It was carried out at surgical unit C of Ayub Hospital Complex, Abbottabad, from Jan 2016 to June 2020. Children from birth to 12 years of age were randomly divided into two groups. In group I (experimental), sacs were cut high up and left open during herniotomy while in group II (control), high ligation of hernia sac was done. Follow up was scheduled for day 10 and 1, 3 and 6 months. Patients were assessed for early recurrence and other complications. **Results**: A total of 151 emergency inguinal herniotomies were done including 147 males (97.4%) and 4 females (2.6%). 136 sacs (90.1%) were ligated with vicryl 3/0 or 4/0 while 15 sacs (9.9%) were left open. We did not find early recurrence, but found 1 case of scrotal hematoma (n=1/15) (6.7%) and 1 case of scrotal oedema (n=1/15) (6.7%) in the experimental group. In control group, complications were similar with 7 cases of hematoma (n=7/136) (5.1%) and 9 cases of scrotal oedema (n=9/136) (6.6%). **Conclusion:** Complications are comparable in herniotomy with or without ligation of sac but ligation adds an extra step. Herniotomy without sac ligation in children is safe and preferable in emergency setup.

Keywords: Paediatric age group; Inguinal hernia; herniotomy; Sac ligation; Irreducible hernia; obstructed hernia; Strangulated hernia

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INTRODUCTION

Herniotomy is the gold standard treatment in inguinal hernia in children.[1,2] The standard procedure is dissection and high ligation of the peritoneal sac at the level of deep ring with absorbable sutures.[3] If untreated, the bowel content of the hernia may get trapped in a narrow space leading to irreducibility and obstruction. Obstructed hernias have to be treated on emergency basis as the blood supply of bowel if compromised, can lead to strangulation and gangrene formation. Once strangulated, some sort of bowel surgery has to be done, in an attempt to restore bowel function which increases morbidity. Recently high ligation in indirect inguinal hernia has been challenged.[3–11] Experimental studies have demonstrated re-peritonealization within 48–72 hours post injury and gross healing usually takes two more days.[3,12] Presence of suture in the peritoneum incites inflammatory response in tissues that may lead to stimulation of dense adhesions.[12] It provides no immediate postoperative benefits; besides it also prolongs surgical time, exposure to anaesthesia and post-operative hospital stay unnecessarily, thus increasing surgery expenses. In contrast, non-ligation of peritoneum leads to less adhesions, quicker return of bowel activity and reduced risk of bowel obstruction after surgery as well as it prevents tearing in extremely thin sacs.[6-8] In summary, the existing data do not show advantages of ligation.[5-9]

On the contrary, some studies suggest that ligation leads to pain and increased discomfort postoperatively.[10–12] Some authors concluded that non ligation doesn't seem to increase the incidence of recurrence as feared.[8]

There is very limited data on non-ligation of sac in emergency inguinal herniotomies in literature. We have already published our study on ligation vs non ligation of sac in elective cases; concluding that leaving the sac open does not lead to early recurrence.[13] In the present study we intended to verify this finding in emergency cases with irreducible or obstructed hernia.

MATERIAL AND METHODS

This quasi-experimental study was carried out at surgical unit C of Ayub Hospital Complex, Abbottabad, from Jan 2016 to June 2020. We conducted a similar study in scheduled hernia cases from Jan 2007 to Dec 2012 and the results confirmed the safety of non-ligation of sac. However, in our previous study, we did not include irreducible and obstructed hernias. In this study, we included all children from birth to 12-years of age presenting in

emergency with irreducible or obstructed inguinal hernia. Children with strangulated hernias with compromised blood supply and in whom we performed gut surgery of any type were excluded from the study as were those with recurrent inguinal hernias, torsion of undescended testis, incomplete records and lost to follow-up. All of the gossamer thin sacs and those that slipped from the grasping forceps and were not easy to retrieve were left open as was done in previous study. Consecutive patients were divided into two groups. In group I which was the experimental group, high dissection of sac was done which was then cut and left open at deep inguinal ring. In group II, also labelled as control group, high ligation of sac at deep ring was done. A single dose of injectable antibiotic was given pre-operatively. Under General Anaesthesia, inguinal canal was accessed openly through an inguinal incision and sac separated from the contents of canal. The sac was then opened and its' contents reduced. In the rest, high ligation of sac at the level of deep inguinal ring with vicryl 3/0 or 4/0 followed by excision of distal sac was done. Wound was infiltrated with local anaesthetics to alleviate post op pain. These surgeries were performed by the same surgical team. Post operatively injectable antibiotics were given for up to 3 days and patients were retained in ward for up to 3 days. Dressing was removed on 10th post op day. Follow up was scheduled for day 10 and thereafter 1, 3 and 6 months. Patients were assessed for complications like seroma, hematoma, oedema and with a vigilant eye on early recurrence. Data was recorded on a specifically designed pro-forma and analyzed on SPSS 21.0.

RESULTS

Inguinal herniotomies were done in a total of 151 emergency cases. Out of these147 were males (97.4%) and 4 were females (2.6%). In 136 cases (n=136/151) (90.1%), sacs were ligated with vicryl 3/0 or 4/0 while in 15 cases (n=15/151) (9.9%) sacs were left open. There were 42 patients in under 1 year age group (n=42/151) (27.8%), 99 patients were from 1–5-years age group (n=99/151) (65.6%) and 10 patients were from 6–12 years age group (n=10/151) (6.6%). We did not find early recurrence in any case (n=0/151) (0%). There was 1 case of scrotal hematoma (n=1/15) (6.7%) and 1 case of scrotal oedema (n=1/15) (6.7%) in the experimental group. In control group, there were 7 cases of scrotal hematoma (n=7/136) (5.1%) and 9 cases of scrotal oedema (n=9/136) (6.6%) (Tables-1, 2). The complications were comparable in both groups

Table-1: Herniotomy type *Complication type crosstabulation

Count	Complication type		Total
	None	Hematoma	
Herniotomy type			
Sac non-ligated	14	1	15
Sac ligated	129	7	136
Total	143	8	151

Table-2: Herniotomy type * Scrotal Oedema crosstabulation

Count	Complication type		Total
	None	Scrotal Oedema	
Herniotomy type			
Sac non-ligated	14	1	15
Sac ligated	127	9	136
Total	141	10	151

DISCUSSION

Inguinal Hernia repair has come a long way since its first record from as early as 1500 B.C. Egyptian papyrus.[14] High Ligation has been the hall mark of hernia surgery in children since it was popularized in 19th century by surgeons like William Wood and Vinzenz Czerny.[15] It has remained our standard of care for a very long time and many were afraid to try anything new against it. Hertzler, in 1919, observed that parietal peritoneal defect in animals endothelialise simultaneously in entirety unlike epidermization of skin from edges. Peritoneal cells are derived de-novo from multipotent mesenchymal cells of underlying granulation tissue.[16] From as early as 1984 new trends emerged in hernia surgery advocating non ligation of hernia sac.[7]-Shulman A.G et al added over 6000 patients to their previous study and concluded that ligation is a needless step in adult hernioplasty in 1993.[10] Professor Munther Haddad, based in UK, reported a few patients with non-ligation of sac in British Association of Paediatric Surgeons (BAPS) meeting in 1995 (personal communication to correspondence author). Today many Paediatric Surgeons have challenged the importance of high ligation of sac. Various studies

have been conducted in elective patients to see if non ligation of sac leads to higher rate of complications like recurrence, oedema and hematoma formation. A. Mohta *et al* concluded that non ligation has no consequences of its own and has suggested this step to be unnecessary.[8] They also concluded that ligation leads to increased post-operative pain as it causes stretching of parietal peritoneum. S.Cecanti *et al*, confirmed that division without ligation of Processus vaginalis is usually followed by spontaneous scaring of peritoneum and complete closure of internal ring and it is time saving.[17] A meta-analysis of Randomized Control Trials was conducted in 2015 by Chun-Yu Kao *et al.* Five trials between 1984-2014 were analyzed for recurrence, post op pain and other complications in the two groups. Sac ligation was associated with higher post op pain and did not show any benefit over non ligation in terms of recurrence and other complications whether done by open method or laparoscopic technique.[18] We have already concluded in our previous study published in 2015[13] that non ligation of sac does not lead to any increased rate of recurrence and other complications in elective cases. We wanted to confirm if same is true for emergency Paediatric Hernia cases as well. Our study concluded that non-ligation of sac does not add to risk of recurrence when compared to non-ligation in elective as well as emergency setup.

The strengths of the study include that we collected data rigorously. Limitations include the quasi-experimental design and sample size which is not comparable in the two groups.

CONCLUSION

Non ligation of hernial sac is a safe practice to follow as it does not expose the patient to any additional risk of complications like recurrence, scrotal hematoma and oedema even if performed in emergency. Complications like hernia recurrence are comparable in herniotomy with or without ligation of sac but ligation adds an extra step. Therefore, Herniotomy without sac ligation is preferable in children in both elective and emergency setups.

AUTHORS' CONTRIBUTION

ZH: Assisted in Surgery, operated under supervision, collected and analysed data and assisted in writing the article. SA: Operated under supervision and independently, helped in writing the article. ZQ: Performed surgeries and helped in data analysis. IK: Conceived the research, performed surgeries, proof reading and corrections of the article.

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