



Application of Mesh Plug Technique in The Repair of Difficult Cases of Recurrent Indirect Inguinal Hernia in Boys

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Background/Purpose: The recurrence of indirect inguinal hernia vary from less than 0.5% to approximately 4%. Recurrence may be attributed to tearing of a friable sac, slipping of the ligature at the neck of the sac or failure to ligate the sac high at the internal ring. In boys, re-operations are difficult and require tedious and careful dissection of the dense fibrous tissue resulting from the earlier surgery. There are definite risks of damaging the vas deferens and testicular vessels. The aim of this study is to evaluate the feasibility and outcome of using the mesh plug technique in the repair of certain difficult cases of recurrent indirect inguinal hernia in male infants and children.

Materials & Methods: This prospective study was carried out at the pediatric surgery unit, surgical department, Zagazig University Hospitals, Egypt during the period from April 2008 to September 2009. The study included 10 boys with recurrent indirect inguinal hernia. Patients were included in the study during the surgical procedure if they have one of the following inclusion criteria: marked adhesions and fibrosis surrounding the cord, distorted anatomy of the inguinal region and patulous internal ring

Results: A total of 10 operations in 10 infants were performed. The patients age ranged from 3 months to 2 years with the mean age (12.1 months). All cases had severe adhesions surrounding the cord structure with marked distortion of the anatomy. Two cases had associated patulous internal ring. The operative time ranged from 20-30 minutes (mean 25 min). The follow-up period ranged from one month to 11 months (mean 5.8 months), during the follow-up period no major complications were noted.

Conclusion: The application of mesh plug technique in the repair of difficult cases of recurrent indirect inguinal hernia in boys is easily applicable, safe and not expensive.

Index Word: Laparoscopes, recurrent indirect inguinal hernia in children, mesh plug technique.

INTRODUCTION

Repair of inguinal hernia is one of the most common operations in pediatric surgical practice. The incidence of inguinal hernia ranges from 0.8 to 4.4% in children of all ages. It is particularly common in the first year of life.¹

The recurrence rate of operated inguinal hernia varies from less than 0.5% to approximately 4%^{2,3}, and has been attributed to the operational setting, i.e. a general department where several surgeons and residents operate upon a limited number of pediatric

patients. Other suggested reasons include junior surgeons or surgeons without specific pediatric surgical training performing the operations.^{4,5} Most recurrent congenital hernias are indirect and probably result from tearing of a friable sac, slipping of the ligature at the neck of the sac or failure to ligate the sac high at the internal ring.⁶ Patient characteristics and biologic factors may predispose to much higher rates of recurrence. Premature neonates are at an increased risk of recurrence compared to other

neonates and children. Chronic lung disease and the presence of ascites increase the complication rate for hernia repair in all ages. In the pediatric population, cystic fibrosis patients and those with ventriculoperitoneal shunts or peritoneal dialysis catheters are at higher risk for recurrence. Patients with connective tissue disorders such as mucopolysaccharidoses and Ehlers-Danlos or Marfan syndrome are also at higher risk for recurrence. Patients with irreducible incarcerated hernias requiring emergency surgery are at increased risk of recurrence. Due to difficult dissection, damage to surrounding structures, and tissue edema. The use of rapidly absorbing suture material such as catgut is also a cause of recurrence.⁷

In boys, re-operations are difficult and require tedious and careful dissection of the dense fibrous tissue resulting from the earlier surgery. There are definite risks of damaging the vas deferens and testicular vessels, which are situated in the midst of the dense fibrous tissue.^{5,8} This article describes a new technique to simplify the repair and minimize the cord dissection with subsequent injuries.

The aim of this study is to evaluate the feasibility and outcome of using the mesh plug technique in the repair of certain difficult cases of recurrent indirect inguinal hernia in male infants and children including recurrent cases with marked adhesions, fibrosis with distortion of the anatomy of the cord and inguinal region and recurrent cases with patulous internal ring.

PATIENTS AND METHODS

This prospective study was carried out at the pediatric surgery unit, surgical department, Zagazig University Hospital, Egypt during the period from April 2008 to September 2009. The study included 10 boys with recurrent indirect inguinal hernia, their ages ranged from 3 months to 2 years. Patients were included in the study during the surgical procedure if they have one of the following inclusion criteria: 1- marked adhesions and fibrosis surrounding the cord. 2- distorted anatomy of the inguinal region. 3- patulous internal ring. The study was approved by the ethical committee of the unit. Parents were informed about using a relatively new technique that was applied successfully in adults with explanation of all hazards of the procedure, and written consents were taken.

Surgical technique:

A small piece of prolene® mesh (2cmx2cm) was designed to form a small cone with obliterated tip (fig.1) and prepared to be used as a plug to obliterate the internal inguinal ring. The skin incision was planned to include the previous scar unless the previous scar was away from the classical site in the inguinal crease. Initial dissection was begun in unscarred tissue planes, which are usually found lateral and superior to the original operative site. The cord structures were identified inferior to the scarred external ring. The inguinal canal was opened where the least scarring is encountered, this may be at the external ring, medial, or lateral to the original incision in the external oblique aponeurosis. If possible, nerve branches were identified and spared. The indirect sac was freed as possible from the cord structure until reduced (invaginated) with ease without ligation through the margins of the internal ring then the mesh plug was inserted to occlude the defect (fig2). The plug was secured with 3-4 interrupted prolene stitches into the edges of the internal ring to eliminate the possibility of plug migration in the inguinal canal (fig3). After good haemostasis the testis was pulled down in the scrotum and the wound was closed in layers. The first follow-up check was performed one week after operation in the out-patient clinic and then every month.

The parameters of age of the patients, follow-up duration, operative time, success rate and post operative complications were noted

RESULTS

A total of 10 operations were performed. All patients were male, presented with recurrent indirect oblique inguinal hernia; their ages ranged from 3 months to 2 years with the mean age (12.1 months). All cases, except 2 were referred from other hospitals or private clinics. In only one case, the failed operation was done by pediatric surgeon. All cases had severe adhesions surrounding the cord structures with marked



Fig1. The design of the mesh plug

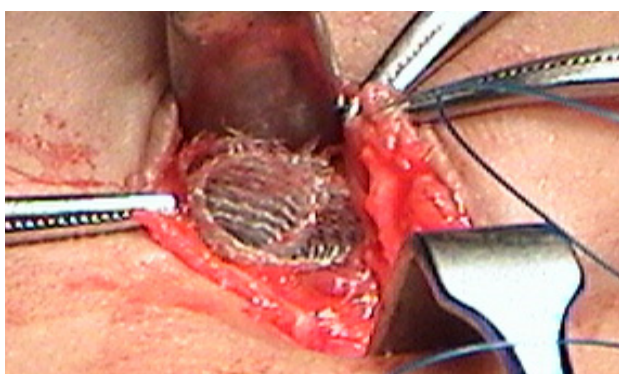


Fig 2. Insertion of the mesh plug in the internal ring

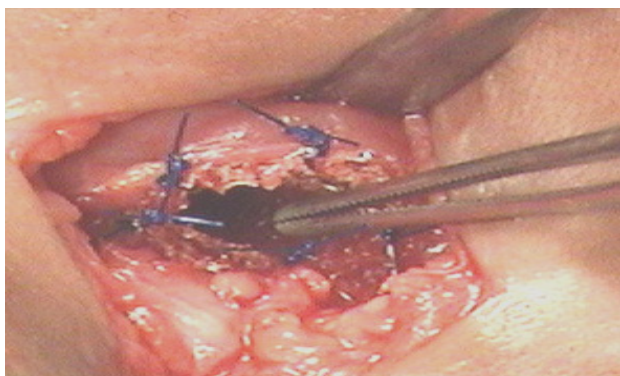


Fig 3. The plug is secured with 3-4 interrupted prolene stitches

distortion and weakness of the anatomy of the inguinal floor. Three cases had associated patulous internal ring. The operative time ranged from 20-30 minutes (mean: 25 min); the only difficulty was encountered during freeing of the sac from the cord structures while the rest of the procedure was easy and smooth. The follow up period ranged from

1month to 11 months (mean 5.8 months). During the follow up period, no complications were noted except minimal post operative oedema of the scrotum at the site of surgery that resolved spontaneously within 1 month. No post operative hydroceles, changes in the size of the testis or recurrence were noticed. No mesh infections, sinus tracts or mesh migration have occurred.

DISCUSSION

We reviewed the literature regarding the management of recurrent inguinal hernia in children. There was no special technique described, but all authors stated that reoperation with control of the peritoneal opening is required, indirect sac should be dissected from the vas and vessels and ligated again "high ligation" with maintaining the integrity of the sac. Formal reconstruction of the floor is recommended if there is any doubt about its integrity.^{5,7} This is risky and technically difficult especially for junior staff.

Although laparoscopic repair and preperitoneal repair represent an alternative anatomic approach that allows the problem to be visualized from a different orientation, still there are no outcome data comparing the reoperative inguinal approach with either of these techniques.^{7,8} The laparoscopic approach is abandoned by some authors especially in boys⁹, and necessitates available equipment and well trained staff.

Before attempting to use this technique we reviewed the literatures about the use of a mesh plug in the repair of indirect adult inguinal hernia and took them as a references that supported our research work.^{10,11}

By application of the mesh plug technique there was no need for high ligation of the sac or repair of the disturbed anatomy of the inguinal region thus avoiding damage of the cord structures or the floor of the inguinal region. According to our early results, we found that the use of mesh plug technique was easier and simpler than the traditional technique, uses minimum medical resources (compared to laparoscopic repair), with no complications. This results nearly matches with the results of mesh plug repair in adults.¹² Although the results are encouraging, the number of patients was small and the follow up period was short to evaluate the long term functional outcome.

CONCLUSION

The application of mesh plug technique in the repair of difficult cases of recurrent indirect inguinal hernia in boys is easily applicable, safe, not expensive, not associated with major complications or recurrence. The technique can be learned easily by the junior staff .

REFERENCES

1. Cheung TT, Chan KL. Laparoscopic inguinal hernia repair in children. *Ann Coll Surg HK.* 7:94-96, 2003.
2. Carneiro PM Inguinal herniotomy in children. *East Afr Med J* 67:359-364, 1990.
3. Meier AH, Ricketts RR. Surgical complications of inguinal and abdominal wall hernias. *Semin Pediatr Surg* 12:83-88, 2003.
4. Borenstein SH, To T, Wajja A. Effect of subspecialty training and volume on outcome after pediatric inguinal hernia repair. *J Pediatr Surg* 40:75-80, 2005.
5. Chan KL. Laparoscopic repair of recurrent childhood inguinal hernias after open herniotomy. *Hernia* 11:37-40, 2007.
6. Fette AM, Hollwarth ME. Special aspects of neonatal inguinal hernia and herniotomy. *Hernia* 5:92-96, 2001.
7. Teich S, Caniano DA. Editor's note: How we do it: repair of recurrent inguinal hernia (comment). *Semin Pediatr Surg* 12:89, 2003.
8. Esposito C, Montupet P. laparoscopic treatment of recurrent inguinal hernia in children. *Pediatric surg. Iner* 14:182-84, 1998.
9. Glick PL, Boulanger SC. Inguinal hernias and hydrocele. In, Grosfeld JL, O'Neill JA, Fonkalsrud EW and Coran AG(eds) *Pediatric surgery*, sixth edition. Philadelphia: Mosby 1172-1192, 2006.
10. Fasih T, Mahapatra TK, Waddington RT. Early results of inguinal hernia repair by the 'mesh plug' technique - first 200 cases. *Ann R Coll Surg Engl* 82: 396-400, 2000.
11. Millikan K W. Doolas A. A long-term evaluation of the modified mesh-plug hernioplasty in over 2,000 patients. *Hernia* 12:257-260, 2008.
12. Palot JP, Avisse C, Cailliez-Tomasi JP. Greffier D and. Flament JB. The mesh plug repair of groin hernias: a three year experience. *Hernia* 2:31-34,1998