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ORIGINAL RESEARCH

Does port type or wound closure technique influence cosmetic outcomes in laparoscopic pediatric urology procedures?

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Abstract

Introduction and aims With the majority of parents choosing laparoscopic approach for their children due to its inherent cosmetic benefits, it is essential that the surgeon aims for the best scar. In this study, we hypothesized that smooth profile port instead of a screw profile port, along with subcuticular/adhesive closure provides a superior cosmetic appearance.

Methods Scars of patients who underwent laparoscopic pediatric urology procedures were analysed based on: Group 1- screw profile port and trans cuticular closure and Group 2- smooth profile port and subcuticular/sealant closure. Junior doctors were asked to rate the overall cosmetic result of scar photographs on a Likert scale of 1 to 5, where 1 = poor, 2 = prominent, 3 = acceptable, 4 = good, and 5 = excellent.

Results In Group 1, 89/112 (79%) scars could be identified while in Group 2, only 32/122 (26%) scars could be identified (p=0.001). Among all the scars analysed (n=234), the umbilical scars were the least noticeable (8/234; 3%), followed by right/ left lower quadrant scars (42/234; 18%). Among the scars correctly identified, the cosmetic result was rated poor/ prominent in 53/89 (60%) in Group 1 versus none in Group 2; acceptable in 34/89 (38%) Group 1 versus 2/32 (6%) in Group 2 and good/ excellent in 2/89 (2%) Group 1 versus 30/32 (94%) in Group 2. The cosmetic outcomes were significantly superior in Group 2 compared to Group 1 (p=0.001).

Conclusions Using a smooth profile port unlike the screw profile port during laparoscopic pediatric urology procedures provides an inconspicuous scar.

Keywords Laparoscopy · Scar cosmesis · Wound closure · Port · Pediatric urology · Minimally invasive surgery

Introduction

In addition to faster recovery, shorter hospital stay, and reduced analgesic requirements, improved cosmesis has been an important factor in parents choosing minimally invasive surgery (MIS) over conventional open surgery [1]. More than 80% of patients undergoing various pediatric urology procedures preferred MIS over open surgery for cosmetic reasons as reported in a study by Barbosa et al. [2]. Due to concerns with MIS scars in exposed parts of the abdomen, single incision laparoscopic surgery—SILS [3] and laparoscopic hidden incision endoscopic surgery-HIDES [4] were introduced.

Brownlee et al. [1] reported that traditional laparoscopic surgery in infants can have an excellent cosmetic result with invisible scars and the cosmetic benefits of SILS or HIDES are therefore questionable. In this study, we wanted to compare cosmetic outcomes of two different ports/skin closures. We hypothesized that a smooth profile port and subcuticular/ adhesive closure should provide a superior cosmetic appearance when compared to a screw profile port.

Methods

Patients who underwent MIS procedures for various pediatric urological conditions between 2016 and 2019 were included. During the initial two years (Jan 2016–December 2017) the procedures were performed using ports with screw profile (Fig. 1a) and the wound was closed with single interrupted undyed polyglycolic acid suture (Group 1). We initially tried subcuticular closure or glue approximation in this

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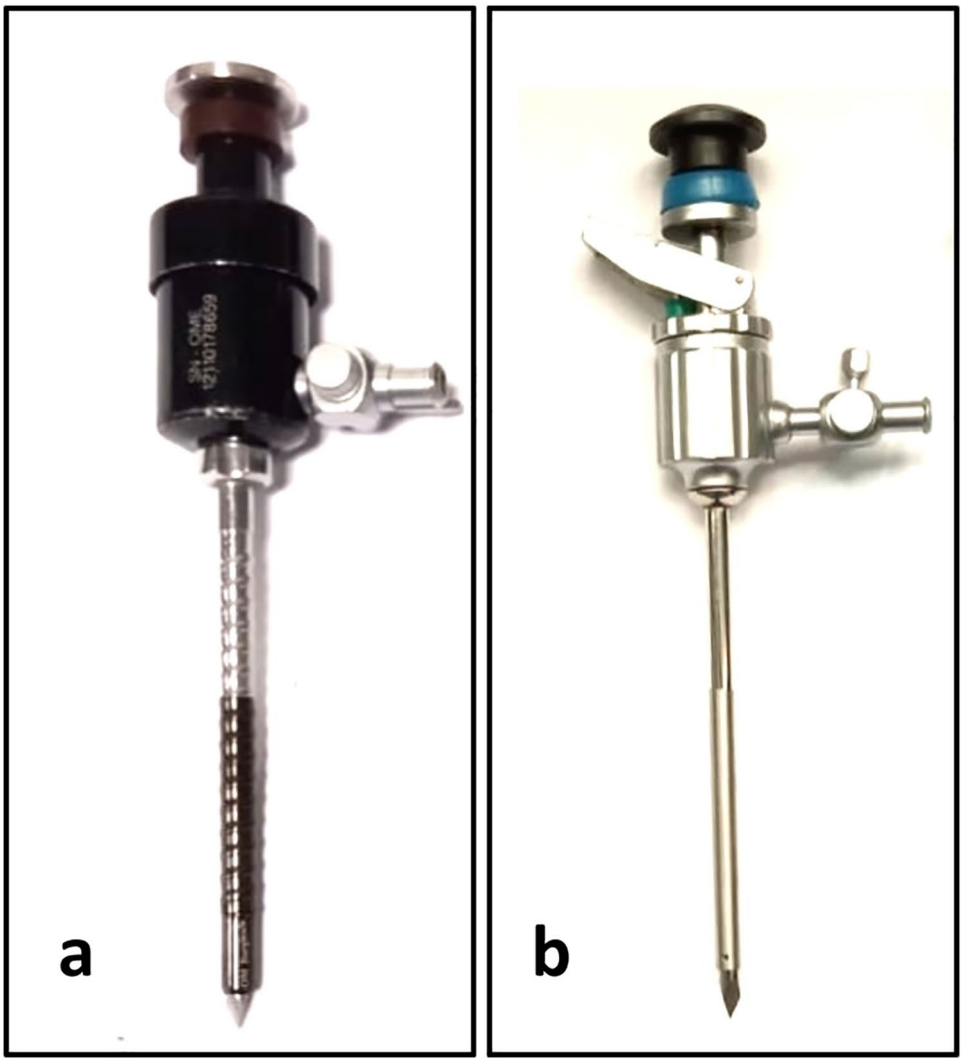

Fig. 1 Different port types evaluated in the study: (**a**) screw profile port (**b**) smooth profile port

group, but the screw profile of the port rendered the wound circular and the approximation of the wound edges was not satisfactory. During the later two years (Jan 2018–December 2019) we changed our technique by using a smooth profile port (Fig. 1b); and the wound was closed with subcuticular undyed polyglycolic acid suture for 5 mm ports or n-butyl-2- cyanoacrylate glue (Truseal® Sutures India Pvt. Ltd., Bengaluru, Karnataka, India) in case of 3 mm ports (Group 2). In Group 1 only interrupted transcutaneous sutures could be used as the screw profile port invariably stretched the wound into a round shape, hence subcuticular/adhesive closure was not possible.

The patients were followed up with photographic assessment of scars one year following surgery. Consent was obtained on standardized hospital consent forms. Photographs were taken by a professional medical photographer under similar lighting conditions (Fig. 2). Photographs were randomly shown to 10 junior doctors (interns or first-year residents) who were not aware of the procedure details. Reviewers were asked to identify and mark any visible scars. There was no marking or benchmark reference for the observers; they looked at the rest of the abdomen and if they could not differentiate the scar from the area around, it was considered as not identifiable. The identifiable scars were then rated by the observers into: 1 = poor, 2 = prominent, 3 = acceptable, 4 = good, and 5 = excellent (Likert scale) as described by Brownlee et al. [1]. The cosmetic outcomes between groups were expressed as percentage and results were compared with Fisher's exact test. A difference with p value of < 0.05 was considered statistically significant.

Results

Out of 82 patients who underwent the MIS procedures, 75 patients responded to our follow up call and attended for clinical photograph assessment after a median gap of 18 months post-surgery (range 12–34 months). There was

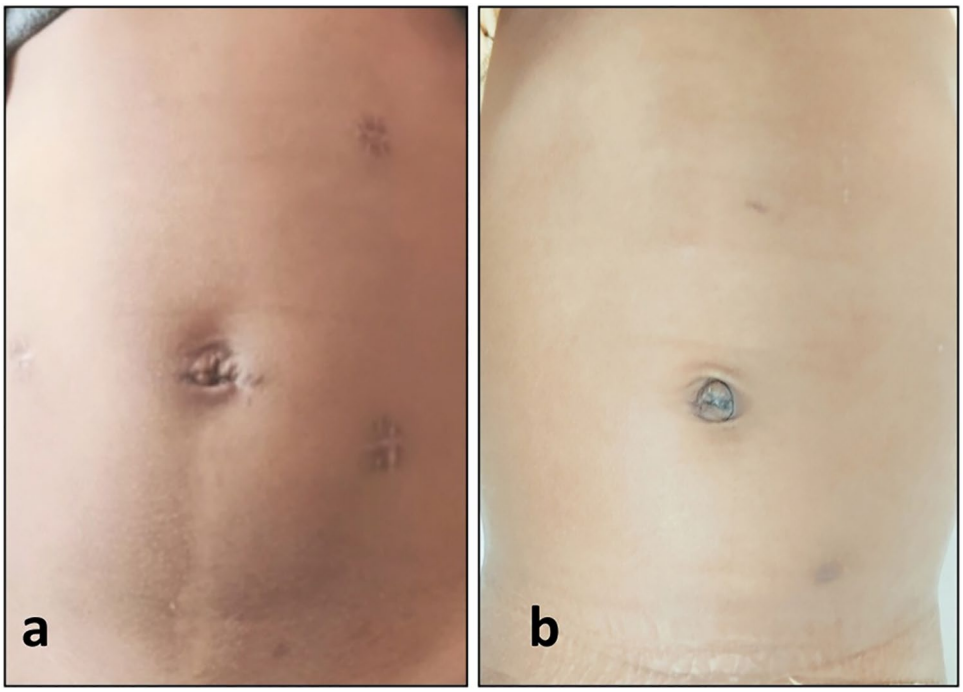

Fig. 2 Scar cosmesis in a patient in whom (**a**) screw profile port/ interrupted transcutaneous closure used (**b**) a smooth profile port and subcuticular or adhesive glue used for closure

Table 1 Demographic data comparing patient characteristics between groups

Characteristic	Group 1 ($n=36$)	Group 2 ($n=39$)	p value
Mean (s.d) age	12 (4.2)	11 (5.5)	0.38
M/F	21/15	27/12	0.96
Procedures	Lap nephrectomy 5 Lap Pyeloplasty 21 Lap reimplant 7 Lap orchidopexy 3	Lap nephrectomy 6 Lap Pyeloplasty 20 Lap reimplant 8 Lap orchidopexy 5	0.34
Number of scars	112 3 ports in 32 patients 4 ports in 4 patients	122 3 ports in 34 patients 4 ports in 5 patients	1.00
Size of ports	10 mm umbilical 14 5 mm umbilical 22 5 mm lateral 31 3 mm lateral 45	10 mm umbilical 15 5 mm umbilical 24 5 mm lateral 32 3 mm lateral 51	0.08
Wound infection/ wound dehiscence	Nil	Nil	NA

no statistically significant difference between the age/sex distribution or the number and site of scars. Table 1 summarizes the demographic data. The mean age at the time of surgery was 11 months (range: 4–42 months). Pyeloplasty was the commonest procedure in both groups; there was no significant difference in the types of operation between the groups. There was no wound infection/ dehiscence in any of these patients in the post-operative period (Table 2).

In Group 1, 89/112 (79%] scars could be identified, compared to 32/122 (26%) in Group 2: this difference was statistically significant ($p=0.001$). Among all the scars analysed ($n=234$), the umbilical scars were the least noticeable (8/234; 3%), followed by right/left lower quadrant scars (42/234; 18%). The right or left upper quadrant scar was the most noticeable one (71/234; 30%). There was no significant difference in scars being identified based on the scar location. Among the scars correctly identified, the cosmetic result was rated poor/ prominent in 53/89 (60%) in Group 1 versus none in Group 2; acceptable in 34/89 (38%) in Group 1 versus 2/32 (6%) in Group 2 and good/ excellent in 2/89 (2%) in Group 1 versus 30/32 (94%) in Group 2. The cosmetic outcomes were significantly superior in Group 2 compared to Group 1 ($p=0.001$).

Discussion

Superior cosmesis is the most important aspect considered by parents when choosing MIS options for their children. Several newer approaches like SILS or HIDES aim to reduce visible scars in the exposed part of the abdomen. Thus it is prudent that laparoscopic surgeons give due importance in laparoscopic closure techniques to avoid an undesirable scar. In this study, we have looked at two different types of port site management and reported our outcomes.

There are very few studies in children on scar closure techniques. Rosen and Carlton [5] in a study of adults showed that subcuticular skin closure was superior to

Table 2 Cosmetic outcomes of scars between the groups

Characteristic	Group 1 ($n=112$)	Group 2 ($n=122$)	p value
Scars identifiable	89/112 (79%)	32/122 (26%)	0.001
Scar locations (among the scars identified)			
Umbilical	6/89 (7%)	2/32 (6%)	0.83
Right/left upper quadrant	52/89 (58%)	19/32 (59%)	0.98
Right/ left lower quadrant	31/89 (35%)	11/32 (35%)	1.00
Cosmesis rating (among the scars identified			
Poor/ prominent	53/89 (60%)	0/32	0.001
Acceptable	34/89 (38%)	2/32 (6%)	0.001
Good or excellent	2/89 (2%)	30/32 (94%)	0.001

transcutaneous closure technique in terms of pain and cosmesis. A prospective randomized trial by Buchweitz et al. [6] in adults showed superior cosmetic outcomes with less wound infection for transcutaneous closure than subcuticular technique. Three randomized trials in adults [7–9] showed that adhesive glue offered a better wound closure technique with improved cosmesis. While Sajid et al. [10] in their meta-analysis found that there was insufficient evidence to support the use of adhesives for laparoscopic wound closures, Coulthard et al. [11] in their Cochrane review concluded that sutures were significantly better than tissue adhesives for minimising dehiscence.

Our findings show that the use of a screw profile laparoscopic port was associated with more prominent scar formation probably due to the shearing force during port insertion and removal, thereby crushing the wound and causing local ischemia. In addition the use of a screw profile port stretched the wound circularly so that we had to resort to interrupting transcutaneous sutures for wound closure, which invariably healed with '+" shaped scar making it easily identifiable by the observer. Making a longer incision is likely to avoid crushing of wounds particularly when screw profile ports are used and probably will enable the use of subcuticular/glue closure.

On the other hand, there was a significant reduction in scar visibility when subcuticular closure (of 5 mm port sites) or cyanoacrylate glue closure (of 3 mm port sites) was used. There was no increase in wound infection or skin inversion causing ugly scars in any of the latter closure methods. There was no increase in wound dehiscence due to glue as we used these only in 3 mm port site closure.

The limitations of this study are the small numbers of patients and in being a retrospective cohort study. We did not group the patients based on skin type, although most belonged to the same ethnicity. In addition, the two variables applied in groups (port profile and closure technique) could have confounded each other. But in Group 1 we could not have used subcuticular/ sealant closure as screw profile port along with a small incision made interrupted closure mandatory. We could have used transcutaneous type of closure in Group 2, although preferred subcuticular/ sealant closure were amenable to the same. Surgeons often leave would closure to the residents who in a hurry to finish the case and use interrupted sutures for wound closure. This paper also stresses the importance of paying attention to skin closure during MIS, to avoid an undesirable scar at follow-up.

Conclusions

Findings of this study show that using a smooth profile port, unlike a screw type profile one, during laparoscopic pediatric urology procedures enables subcuticular/ adhesive glue closure and thus provides an inconspicuous scar. Further larger prospective randomized studies are warranted in infants and children to find ways to improve cosmetic outcomes of laparoscopic port sites.

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Declarations

Conflict of interest Not applicable.

Ethical approval IRB approval: IEC/20/OCT/159/38.

Consent to participation Obtained.

References

1. Brownlee EM, MacKinlay GA, Lam JPH (2013) Is it possible for "traditional" laparoscopic surgery to leave "invisible" scars? J Laparoendosc Adv Surg Tech 23:78–80. https://doi.org/10.1089/lap.2012.0047
2. Barbosa JABA, Barayan G, Gridley CM, Sanchez DCJ, Passerotti CC, Houck CS, Nyugen HT (2013) Parent and patient

perceptions of robotic vs open urological surgery scars in children. J Urol 190:244–250. https://doi.org/10.1016/j.juro.2012.12.060

3. Till H, Metzger R, Woller T, Buehligen U, Stolzenburg J-U (2010) Single incision laparoscopic surgery (SILS) in pediatric urology: decortication of a symptomatic renal cyst in a 14-year-old boy. Eur J Pediatr Surg 20:132–133. https://doi.org/10.1055/s-0029-1234118
4. Cezarino BN, Lopes RI, Berjeaut RH, Dénes FT (2021) Laparoscopic hidden incision endoscopic surgery (hides) nephrectomy VS Traditional laparoscopic nephrectomy: Non-inferior surgical outcomes and better cosmetic results. J Pediatr Urol. https://doi.org/10.1016/j.jpurol.2021.01.018
5. Rosen DMB, Carlton MA (1997) Skin closure at laparoscopy. J Am Assoc Gynecol Laparosc 4:347–351. https://linkinghub.elsevier.com/retrieve/pii/S1074380405802269
6. Buchweitz O, Wulfing P, Kiesel L (2005) A prospective randomized trial of closing laparoscopic trocar wounds by transcutaneous versus subcuticular suture or adhesive papertape. Surg Endosc 19:148–151. https://doi.org/10.1007/s00464-004-9043-2
7. Ben Safta Y, Maatouk M, Bouzidi MT, Sakly N, Mabrouk A, Bouafif M, Sghaier S, Maghraoui H, Dziri C, Ben Moussa M (2020) A randomised clinical trial to compare octyl cyanoacrylate with absorbable monofilament sutures for the closure of laparoscopic cholecystectomy port incisions. Int Wound J 17:449–454. https://doi.org/10.1111/iwj.13294
8. Custis T, Armstrong AW, King TH, Sharon VR, Eisen DB (2015) Effect of adhesive strips and dermal sutures vs dermal sutures only on wound closure. JAMA Dermatol 151:862-867. https://doi.org/10.1001/jamadermatol.2015.0174
9. Chen K, Klapper AS, Voige H, Del Priore G (2010) A randomized, controlled study comparing two standardized closure methods of laparoscopic port sites. JSLS 14:391–394. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3041037/
10. Sajid MS, Siddiqui MR, Khan MA, Baig MK (2009) Meta-analysis of skin adhesives versus sutures in closure of laparoscopic port-site wounds. Surg Endosc 23:1191–1197. https://doi.org/10.1007/s00464-009-0373-y
11. Coulthard P, Esposito M, Worthington HV, der Elst M, van Waes OF, Darcy J (2010) Tissue adhesives for closure of surgical incisions. In: Coulthard P (ed) Cochrane database of systematic reviews. John Wiley & Sons Ltd