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UROLOGY - ORIGINAL PAPER

Does the internal inguinal ring need closure during laparoscopic orchiopexy with Prentiss manoeuvre?

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Abstract
Background Undescended testis is a common problem, which is prevalent in 3 % of male infants. This study aimed to determine the effect of leaving the deep inguinal ring (DIR) without closure during laparoscopic orchiopexy (LO), with regard to post-operative hernia formation and other outcomes.
Methods From 2012 to 2014, 63 testicular units were managed with laparoscopy for non-palpable testis (NPT). Diagnostic laparoscopy was performed for all NPTs, and when they were intra-abdominal (42 testicular units), the DIR was left open after mobilization of the testis into the scrotum medial to the inferior epigastric vessels (Prentiss manoeuvre). We followed up these cases to check for hernia formation.
Results The ages ranged from 10 months to 11 years with mean age at 3.7 years. Clinically, no cases presented with hernia, hydrocele or any other complications during a mean follow-up period of 34.4 months.
Conclusion Closing the peritoneum over the DIR might be omitted in LO with Prentiss manoeuvre, saving operative time and effort. By doing so, there is no risk of hernia formation.

Keywords Orchiopexy · Prentiss manoeuvre · Laparoscopy · Post-operative hernia

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Introduction

The undescended testis (UDT) is one the most common congenital abnormalities found in newborn males, affecting up to 4 % of full-term newborns and up to 45 % of preterm males [1]. About 20 % of UDTs are considered non-palpable testis (NPT) [2]. Laparoscopic orchiopexy (LO) has become the preferred approach for the management of the NPT. During LO, some surgeons routinely close the peritoneum over the deep inguinal ring (DIR) [3, 4], while others believe that this might not be necessary [5, 6]. The present study was undertaken to evaluate whether this step is warranted and whether leaving the DIR without closure predisposes to post-operative inguinal hernia formation.

Materials and methods

From January 2012 to January 2014, 57 consecutive patients with 63 NPTs (bilateral in six) treated with laparoscopic surgery at our institution were retrospectively reviewed. All these patients were initially assessed by clinical examination. Six patients presented to us with ultrasonogram reports performed elsewhere, but did not influence our decision-making. No further investigations were ordered apart from the baseline tests. Our protocol involved examination under anaesthesia followed by diagnostic laparoscopy and definitive treatment.

Among the 57 patients, seven instances where the intra-abdominal testis (IAT) was located more than 2.5 cm from the DIR (and hence deemed short cord length) and therefore managed with Fowler–Stephen's staged approach were excluded, leaving 50 patients with 56 testicular units. Blind-ending vas was noticed in two cases where no inguinal exploration was done. The vas with vessels was seen

exiting a closed DIR in 12 patients where inguinal exploration was done to remove the testicular nubbins. Following these 14 exclusions, we were left with 36 patients with IAT (42 testicular units—bilateral in six) with open DIR. In all these patients, we proceeded to do a single-stage LO with Prentiss manoeuvre (testis brought down medial to the inferior epigastric vessels) for mobilization of the testis into the scrotum, given that the mobilized testis was able to reach the contralateral DIR. The ipsilateral DIR was left open for all these 42 testicular units. Standard testicular fixation was subsequently performed by making sub-dartos pouch. Post-operatively, the patients were reviewed by senior faculty in the outpatient clinic 2 weeks after discharge and at 2, 6 months and yearly intervals thereafter. The follow-up evaluations were done to rule out hernia/hydrocele formation, testicular atrophy, ascent of testis and malignancies.

Technique

The urinary bladder was emptied prior to the insertion of the trocars. With the patient under general anaesthesia in the supine Trendelenburg position, an umbilical 5-mm trocar was introduced under direct vision by an open technique, and CO_2 pneumoperitoneum was induced. The telescope was inserted through the umbilical port. In the presence of intra-abdominal testis (IAT), two additional 5-mm working ports were placed in the mid-clavicular line at or just below the level of the umbilicus. In cases with the IAT located within 2.5 cm of the internal ring, single-staged LO ensued and the gubernaculum was divided as a first step. The testicular vessels and the vas were subsequently mobilized. The adequacy of mobilization was checked with movement of the testis to the contralateral DIR. Once the testicular vessels and vas were maximally mobilized, a long haemostat was introduced through the scrotum into the abdomen medial to the inferior epigastric vessels (Prentiss manoeuvre) [7]. The testis was grasped by the haemostat at the gubernaculum and brought down avoiding tension and ensuring correct orientation. Intra-scrotal fixation with 4/0 Vicryl suture was done after creating a sub-dartos pouch.

Results

Of the 57 patients with UDT, 34 (59.6 %) were right sided, 17 (29.8 %) were left sided and six (10.5 %) were bilateral. The ages ranged from 10 months to 11 years with mean age at 3.7 years. During laparoscopy, a 'vanishing' testes with blind-ending vas and vessels were found in 3.5 % ($n = 2$) and atrophic in 17.5 % ($n = 12$). The testis was intra-abdominal in 42 cases. The follow-up ranged from 25 to 49 months (mean of 34.4 months). Three patients were lost to follow-up after the third year. Clinically, no cases presented with hernia or any of the complications listed above, although the testis remained high scrotal in five patients.

Discussion

Laparoscopy has been established as the most reliable diagnostic modality for the management of NPT. It clearly demonstrates the anatomy and provides visual information upon which a definitive decision can be made [8]. The American Urological Association guidelines on undescended testis do not recommend ultrasound for evaluation. For the assessment and diagnosis of NPT, other imaging modalities like computed tomography (CT) or magnetic resonance imaging have also not been found dependable [9, 10], especially when laparoscopy is available both as a diagnostic and as a therapeutic modality. Notwithstanding, the CT has radiation hazards.

During open inguinal orchiopexy, traditionally, the hernia sac has been dissected and methodically freed from the cord structures and suture ligated proximally at the DIR. This was done to achieve adequate length of the cord to mobilize the testes to the scrotum without undue tension and to prevent the development of hernia post-operatively. However, in LO, since the testis is mobilized internally, the necessity for DIR closure becomes contentious. In LO, the viable testis can be brought down to scrotum in two ways, through the native inguinal canal or through Prentiss manoeuvre. Whenever authors have advocated leaving the DIR alone without closure, they have done it only if the testis has been brought into the scrotum in a retrograde manner, through the native inguinal canal. The concept was that the apposition of the raw surfaces at the DIR and the spermatic cord would preclude the formation of a post-operative inguinal hernia in future. On the other hand, when a Prentiss manoeuvre was required or preferred, the native ring was obliterated with a suture [11, 12].

In the present study, we have performed Prentiss manoeuvre for all patients, as a matter of preference, while the DIR was left unclosed. This approach was prompted by similar rationale that the division of the gubernaculum (an initial step in LO) and the extensive dissection thereafter leave a large raw area at the DIR, regardless of the Prentiss manoeuvre. Healing of the peritoneum occurs spontaneously and so does the closure of DIR. Khairi et al. have similarly described leaving the native DIR alone in 49 % of their cases (when new ring was created) with not a single case of hernia reported. In opportune situations, when a second look was in order for a contralateral LO as early as after 2–3 months (three cases in this series where bilateral UDT was managed in two stages), we have observed the ipsilateral DIR to be pristine. By the same logic, many surgeons

favour non-closure of the sac in open orchiopexies and herniotomies, without dreading a hernia post-operatively on long follow-up [13–15]. While there are a few studies in this direction on review of literature, this series is novel for the fact the all patients in this group were managed with Prentiss manoeuvre during the LO. In this study, while we recognize that the sample size is rather small, the follow-up period is reasonable (34.4 months), considering that a potential hernia if present due to an open DIR would manifest in the first few months itself. A prospective study with a larger sample, perhaps multi-institutional analyses, could validate this fact.

Conclusions

We propose that closing the peritoneum over the area of the DIR in LO might be omitted even when the testes are brought to the scrotum through a new opening medial to the inferior epigastric vessels, saving operative time and effort. By doing so, it does not predispose to hernia formation. However, additional evaluation of this strategy with bigger sample size is needed.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

Informed consent Informed consent was obtained as applicable from all individual participants included in the study.

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