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Outcomes of a structured training programme for paediatric laparoscopic inguinal hernia repair

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Abstract

Introduction: A structured training programme for laparoscopic paediatric inguinal hernia (LPIH) repair was devised. This programme was evaluated to ensure patient safety by assessing long-term outcomes of operated patients.

Method: Training Programme — Trainees undergo at least monthly consultant-supervised simulation sessions using the LPIH model. They then undertake live-operating in a step-wise progression: (A) laparoscopic ports insertion and wound closure, (B) intra-corporeal knot tying, and (C) purse-string suturing of hernial orifice.

Study — All patients undergoing LPIH repair from July 2003 to Sept 2011 were analysed. Trainee involvement was recorded prospectively, and patients were classified: Group 1 — Consultant only; Group 2 — Trainee performed step A; Group 3 — Trainee performed steps A & B; Group 4 — Trainee performed all steps.

Results: 224 patients were identified (175 male; 49 female). Average age at surgery was 2.2 years [range: premature (35/40 weeks) to 15 years]. The laterality of the inguinal hernia was: right (n=133), left (n=75), bilateral (n=16). Primary operator was defined as Group 1 n=88 (39%), Group 2 n=25 (12%), Group 3 n=57 (25%), and Group 4 n=54 (24%). Hernia recurrence occurred in 2 (1.8%) children where consultant operated and two (1.8%) where a trainee operated. Post-operative groin swelling (resolved spontaneously) occurred in 2 (1.8%) where consultant operated and 2 (1.8%) of the trainee cases. There were 3 children with iatrogenic post-operative cryptorchidism requiring subsequent orchidopexy, all from Group 3.

Conclusion: This study shows that comparable outcomes can be achieved with a structured training programme for LPIH repair for trainees. The exception appears to be iatrogenic cryptorchidism that only occurred in trainee Group 3.

Simulation devices are being increasingly used in modern surgical training. In part, this may be to compensate for recent restriction in trainee duty hours, but, they are an alternative to a real patient and allow the trainee to undertake procedures without subjecting a real patient to excess risk while at the same time allowing the trainers to have full control of the session [1,2]. A higher complication rate as a result of a learning process is no longer acceptable [3].

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A training programme for laparoscopic paediatric inguinal hernia (LPIH) was devised based on the low-fidelity simulation model as described by Jaffer et al. (2009) [4]. The Best Evidence Medical Education (BEME) recommendations were considered when constructing this programme [5]. They stated that the model had to be valid otherwise it would be unrealistic and not transferrable, and once developed, the training programme itself needs to be evaluated to ensure patient safety.

The aim of this study was to evaluate the effectiveness of this training programme for surgical trainees by analysing the long-term outcomes of the paediatric patients that underwent laparoscopic inguinal hernia repair.

1. Methods

1.1. Training programme

Surgical trainees underwent, at least monthly, formal consultant supervised simulation sessions using the LPIH training model (Fig. 1). Between these sessions, the trainees were able to access the simulation suite and model for their own practice. Towards the later years, the trainees had a portable trainer in their office which was more easily accessible at any time.

Trainees then undertook live operating in step-wise progression in perceived order of difficulty: (A) insertion of laparoscopic ports and wound closure, (B) intra-corporeal knot tying, and (C) placement of purse-string around the hernial defect. Once the trainee was deemed competent with one stage, he progressed to undertake the next stage. The consultant surgeon was always present for every patient in this study. Formative feedback was given at the end of each session for the trainee to use at the next simulation session.

1.2. Surgical technique

All patients underwent general anaesthesia and endotracheal intubation. A 5 mm camera port was inserted under vision via a vertical trans-umbilical incision. Carbon dioxide was used to create the pneumoperitoneum with intra-abdominal pressures initially at 12 mmHg for working ports insertion and then lowered to 8 mmHg for the hernia repair. Two 3 mm working ports were inserted in the flanks below the level of the umbilicus under direct vision. Initial laparoscopy with a 30° 5 mm camera was undertaken to assess the hernial orifices. The hernial orifice was deemed open if there was palpable air within the ipsilateral scrotum or inguinal canal and if the tip of the laparoscopic needle holder could be passed into the orifice so that the jaws could no longer be seen. Before closure, any hernial contents were returned into the abdominal cavity. If the patient was <3 years, a non-absorbable, monofilament 4/0 Prolene (Ethicon) suture on a 17 mm round-bodied needle was passed into the abdominal cavity through the anterior abdominal wall. If the patient was>3 years, a 3/0 Prolene suture was used. The hernia was closed with a peritoneal purse-string that was tied intra-corporeally. Herniorrhaphy was not undertaken. If the contralateral hernia orifice was deemed to be open, it was closed at the same time with the same technique. The needle was removed with the working ports. The umbilical port site was closed with 4/0 Vicryl for the deep fascia and 5/0 Vicryl for subcuticular closure. The 3 mm working port sites were closed with a single 5/0 Vicryl subcuticular suture. Local anaesthetic was infiltrated at the end of the operation (1 mg/kg of 0.25% Chirocaine).

Fig. 1 Laparoscopic Paediatric Inguinal Hernia (LPIH) Model [4].

1.3. Study methods

All patients under the age of 16 years undergoing laparoscopic inguinal hernia repair from July 2003 to Sept 2011 under the care of a single paediatric surgeon were included. Trainee involvement intra-operatively was recorded prospectively and patients were classified accordingly:

Group 1 — Consultant only
Group 2 — Trainee performed step A (Insertion of laparoscopic ports and wound closure)
Group 3 — Trainee performed steps A and B (Insertion of laparoscopic ports, wound closure and intra-corporeal knot tying)
Group 4 — Trainee performed all steps (Insertion of laparoscopic ports, wound closure, intra-corporeal knot tying and placement of purse-string around the hernial defect).

Long-term outcomes were obtained by a retrospective case notes analysis combined with cross-referencing electronic hospital records. Therefore, if the patient was referred back to our department under another paediatric surgeon, they could still be identified. Also, we could assess whether the same child had been referred or been seen in our hospital for any condition since the hernia operation until the search date of January 2012.

The study was regarded primarily as an audit of outcome and hence formal ethical approval was not sought.