General paediatric surgery for patients aged under 5 years: a 5-year experience at a district general hospital

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ABSTRACT

INTRODUCTION The gradual shift of general paediatric surgery (GPS) provision from district general hospitals (DGH) to specialised units is well recognised in the UK. The consequences of centralisation include a reduction in exposure to GPS for current surgical trainees. The GPS practice of a DGH is examined here.

METHODS All operations performed on children aged under 5 years over a 5-year period were identified using the local electronic operation database. Electronic hospital records and clinic letters were accessed to collect data on demographics, operations performed and outcome measures.

RESULTS 472 GPS operations were performed on children between the age of 22 days and 5 years between 2009 and 2014, of which 43 were on an emergency basis and 105 were performed on patients aged less than 1 year. Three patients were admitted following day case surgery. Six patients were readmitted within 30 days. Complication rates for all procedures and the four most common procedures were similar to those found in published literature.

CONCLUSIONS GPS for patients aged less than 5 years is comparatively safe in the DGH setting. The training opportunities available at DGHs are invaluable to surgical trainees and vital for sustaining the future provision of GPS by such hospitals.

KEYWORDS

General surgery – District hospital – Medical audit – Paediatric surgery

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General paediatric surgery (GPS) is the surgical management of relatively common, non-specialised conditions in general surgery and urology in children who do not require complex perioperative care. Examples of procedures include inguinal herniotomy, hydrocele repair, circumcision and orchidopexy, as well as emergency operations such as appendicectomy, exploration for testicular torsion and repair of irreducible inguinal hernia.

The gradual shift of GPS provision from district general hospitals (DGH) to specialised tertiary units is well recognised in the United Kingdom. The possible consequences of centralisation include a reduction in exposure to GPS for current trainees, further potentiating this shift in care provision. A survey of UK hospitals in 2010 showed that 178 of 308 DGHs provided GPS services, of which 14% had a minimum age limit for anaesthesia of 5 or more years and only 16% had facilities to anaesthetise children from term.¹ However, many GPS procedures are undertaken for conditions that occur in children aged less than 5 years.

The practice at one DGH that provides GPS for children aged from term onwards is examined here, with the aim of assessing outcome measures such as complication rates, unexpected admission following surgery and readmission within 30 days.

Methods

All operations performed in children aged under 5 years between November 2009 and November 2014 at Wexham Park Hospital were identified using the local surgical electronic database. From these, only the general surgical patients were selected. For each patient, the electronic patient record system and the operation database were accessed to collect data concerning demographic details, operation performed, length of hospital stay and intraoperative complications. In addition, clinic letters were reviewed to identify postoperative complications. Electronic patient records and discharge summaries were analysed to calculate readmission rates within the first 30 days and to ascertain the reason for readmission.

Results

A total of 472 GPS operations were performed on children aged under 5 years over the study period, of which 430 were elective and 42 were emergency. One consultant with an interest in GPS performed 333 (71%) of the procedures. The majority of patients were male (83%). In 105 (22%) operations, the patients were aged less than 1 year, with the

youngest patient aged 22 days. Figure 1 shows the age distribution for elective and emergency operations.

As there were several instances in which multiple procedures were undertaken during one operation, the total number of individual procedures performed was 483. The most common procedures were inguinal herniotomy, orchidopexy, circumcision and hydrocele repair, which together constituted more than 70% of the caseload. Table 1 shows the distribution of procedures performed in the elective and emergency settings.

For elective cases, all but three of 430 day-case patients were discharged on the same day, with two cases of orchidopexy and one of inguinal herniotomy. The maximum length of stay was 2 days. The reasons for unexpected hospital stay were parental preference and pain relief.

For emergency cases, the median length of hospital stay was 2 days and the mean was 6.0 days, at a maximum length of 63 days for a patient who had Hickman line insertion while under the care of the paediatric team. One patient was transferred to the paediatric high dependency unit for the initial postoperative period following pyloromyotomy.

Complications were identified in 22 (5%), as listed in Table 2. Two cases were of Clavien-Dindo grade III, requiring further surgical intervention.² In seven cases, the complications were recurrences of the original condition detected on long term follow-up, and elective re-operations were undertaken. There were seven occurrences of wound infection requiring antibiotic therapy and one case of a small intra-abdominal collection following open appendicectomy, also treated with antibiotic therapy. Outpatient clinic follow-up was documented in 307 (65%) patients.

Table 3 lists the six patients who were readmitted within 30 days postoperatively and the reasons for readmission. In four cases, the reason was unrelated to the surgery. One patient was admitted with difficulty passing urine following circumcision, but this resolved without intervention. One patient had a planned readmission for urological

Table 1 Number of elective and emergency cases listed by procedure performed

Procedure	Elective	Emergency	Total
Herniotomy	109	3	112
Orchidopexy	105	1	106
Circumcision/procedures on foreskin	63	0	63
Hydrocele repair	60	0	60
Umbilical hernia repair	28	0	28
EUA rectum and related procedures	20	2	22
Tongue Tie	22	0	22
Incision and drainage of abscess	2	14	16
Appendicectomy	0	9	9
Pyloromyotomy	0	8	8
Excision/biopsy of lump	6	1	7
Orchidectomy	7	0	7
Excision of skin lesion	6	0	6
Epigastric hernia repair	6	0	6
Insertion or removal of CVC	0	5	5
Excision of thyroglossal cyst	3	0	3
Paraumbilical hernia repair	2	0	2
Laparoscopy	1	0	1
Total	440	43	483

CVC = central venous catheter; EUA = examination under anaesthetic

intervention following a complication. Thirty five patients presented to the accident and emergency department or paediatric assessment unit within 30 days, but were not admitted following review.

Discussion

The provision of GPS depends not only on the availability of surgeons who are trained in and, regularly undertake, GPS but also on the establishment within the hospital infrastructure of anaesthetic, paediatric, radiological and nursing support with the appropriate expertise.⁵ It has been the trend over the last few decades that fewer and fewer DGHs have a multidisciplinary team that is suitable for providing GPS, especially for children aged less than 5 years.⁴⁻⁶ This has been demonstrated in various studies and surveys that have shown an increasing number of hospitals with lower age limits for anaesthesia and surgery,^{1,6} and the decreasing volume of index GPS operations being performed by general surgeons.^{7,8}

Our data show that it is possible to provide a safe and sustainable service for GPS, even in those younger than 5 years of age, in the setting of a DGH. A reliable day surgery service was based on the availability of a general surgeon and

Figure 1 Number of elective and emergency cases by age

N	Age	Case type	Operation	Complication	Management
1	<1	Elective	Inguinal herniotomy	Tearing of posterior wall of peritoneum	Re-exploration and sac closure
1	2	Elective	Orchidopexy (second stage)	Injury to mega-ureter	J-J stent
1	<1	Elective	Inguinal herniotomy	Bradycardia & bigeminy	Cardiology investigation
1	4	Emergency	Appendicectomy	Collection <2 cm	Antibiotics
4	2–4	Elective	Circumcision	Wound infection	Antibiotics
1	4	Elective	Unilateral orchidopexy	Wound infection	Antibiotics
1	2	Elective	Repair of hydrocele	Wound infection	Antibiotics
1	<1	Elective	Inguinal herniotomy	Wound infection	Antibiotics
4	1–3	Elective	Unilateral orchidopexy	Recurrence	Re-operation
1	<1	Elective	Inguinal herniotomy	Recurrence	Re-operation
1	<1	Elective	Excision of perianal sinus	Recurrence	Re-operation
1	2	Elective	Thyroglossal cyst	Recurrence	Re-operation
1	3	Elective	Herniotomy	Haematoma	Conservative
1	<1	Emergency	Pyloromyotomy	Persisting vomiting	Conservative
1	1	Elective	EUA rectum	Insufficient biopsy	–
1	3	Elective	Unilateral orchidopexy	Port site hernia	–

EUA = examination under anaesthetic

Procedure	Case type	Reason	Treatment
Herniotomy	Elective	Bronchiolitis	Medical
Orchidopexy	Elective	UTI	Antibiotics
EUA rectum	Elective	Erythema multiforme	None
Orchidopexy	Elective	Viral induced wheeze	Medical
Circumcision	Elective	Unable to pass urine	None
Orchidopexy	Elective	Planned admission following complication	Urological intervention

EUA = examination under anaesthetic; UTI = urinary tract infection

anaesthetist with a specialist interest in GPS, running a dedicated weekly paediatric list, along with the support of experienced paediatric nursing staff. Fortnightly dedicated paediatric clinics enabled initial assessment for appropriate selection for surgery, as well as routine postoperative follow-up.

Complication rates in the published literature and our series for the four most frequently performed GPS procedures are summarised in Table 4.^{9–14} This demonstrates that the overall complication rate of 5% is comparable to that of published GPS studies.^{15–18} It is also notable that the data

Procedure	Complication	Current study	Published literature
Inguinal herniotomy ^{9,10}	Haematoma	0.9	0.8
	Infection	0.9	0.8
	Recurrence	0.9	0.6–4.0
	Testicular atrophy	0	6
	Other	0.9	–
Orchidopexy ^{11,12}	Bleeding	0	0.8
	Infection	0.9	–
	Atrophy	0	0-12
	Recurrence	3.8	<5
	Other	1.9	–
Circumcision ¹³	Infection	6.3	8.5
	Haemorrhage	0	1.5
	Other	1.6	–
Hydrocele repair ¹⁴	Infection	1.7	0.6
	Recurrence	0	0.4
	Haematoma	0	0.1
All procedures ^{15–18}	Overall	5	1–4.5
All values %			

presented here involved patients aged under 5 years, whereas most published data included a subset of patients below the age of 16.

A limitation of this study is the lack of a robust data collection method for postoperative complications. Overall, 65% of patients were reviewed in the outpatient clinic for follow-up. Some conditions such as circumcision and excision of skin lesion were not routinely reviewed, while 6% of patients were offered clinic follow-up but did not attend the appointment. In comparison, other studies have reported follow-up rates of 18%–91% following GPS in a DGH.^{16–18}

We demonstrated an unexpected admission rate following day surgery of 0.7%. This compares favourably with a previous study investigating unplanned admission at a tertiary specialised unit, which reported a rate of 1.8%.¹²

To ensure the future provision of GPS, the delivery of high-quality training opportunities must be facilitated in hospitals where GPS is performed on a regular basis. The gradual shift of the GPS workload to tertiary units has a significant impact on where GPS training can be delivered. Many of the common GPS operations are performed on patients aged less than 5 years, so it must follow that adequate GPS training can only be offered in sites where surgery is routinely performed on this age group. A survey of higher surgical trainees revealed that only 20% would operate on a patient with appendicitis aged 2–5 years, which rises to more than 60% if patient is aged 5–7 years.¹⁹

Conclusions

With many hospitals having raised their minimum age limits for anaesthesia and the dwindling number of surgeons able to perform GPS, the overall number of GPS operations performed in non-specialised units is decreasing. However, the most important consideration is whether it is still possible to maintain patient safety and outcomes in the DGH setting. In this report of our experience at a typical DGH, GPS for patients aged less than 5 years is demonstrated to be comparatively safe.

It is concerning that the current circumstances will lead to a vicious cycle of fewer and fewer training opportunities and further reductions in the workforce with sufficient experience and the appropriate skillset. It is necessary to safeguard the invaluable training opportunities available at DGHs to ensure the adequate provision of GPS in the future.

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