Inguinal hernia repair: local or general anaesthesia?

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ABSTRACT

INTRODUCTION Specialist hernia centres and public hospitals with a dedicated hernia service (Plymouth Hernia Service) have achieved remarkable results for inguinal hernia repair with the use of local anaesthesia and set the standards for groin hernia surgery. There is minimal data in the literature as to whether such results are reproducible in the National Health Service in the UK.

PATIENTS AND METHODS A retrospective analysis of all inguinal hernia repairs performed in one district general hospital over a 9-year period was performed. The outcome measures were type of anaesthesia used, early and late postoperative complications and recurrence. A postal questionnaire survey was conducted to obtain satisfaction rates. In addition, a postal questionnaire survey of consultant surgeons in Wales was performed to determine the use of local anaesthesia and day-case rates for inguinal hernia repair.

RESULTS A total of 577 hernia repairs were performed during the study period. Of these, 369 (64%) repairs were performed under local anaesthesia (LA) and 208 (36%) under general anaesthesia (GA). Day-case repair was achieved in 70% (400) of cases. The day-case rates were significantly higher under LA compared to GA (82.6% versus 42.6%; $P < 0.05$). Patients operated under LA had lower postoperative analgesic requirements and lower incidence of urinary retention compared with the GA group ($P < 0.05$). There were 7 (1.2%) recurrences at a median follow-up of 5.1 years (range, 10.3–2.5 years). Postal questionnaire revealed higher satisfaction rates with LA compared to GA repair. Only 15% of surgeons in Wales offer the majority of their patients local anaesthetic repair.

CONCLUSIONS The use of LA results in increased day-case rates, lesser postoperative analgesic requirements and fewer micturition problems. The excellent results obtained by specialist hernia centres can be reproduced by district general hospitals by increasing the use of LA to repair inguinal hernias.

KEYWORDS

Inguinal hernia – Local anaesthesia – District general hospital

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Inguinal hernia repair is one of the most commonly performed operations world-wide.¹ However, there is no common consensus among surgeons regarding the best choice of anaesthesia. Several retrospective and randomised controlled trials have shown that local anaesthesia provides the best clinical and economic benefits to patients.^{2–6} In spite of this, the use of local anaesthesia for inguinal hernia repair in the UK is not a common practice.⁷ Local anaesthetic inguinal hernia repair in the UK is being performed mostly in centres with a specialist interest in hernia repair or public hospitals with a dedicated hernia service (Plymouth Hernia Service) and excellent results have been achieved both in terms of high day-case rates and reduced long-term recurrence (Table

1).^{8–10} However, there is minimal data from district general hospitals where inguinal hernia repair is one of the most commonly performed procedures. This study aimed to: (i) analyse the outcomes of inguinal hernia repair in a district general hospital in Wales with special emphasis on the use of local and general anaesthesia, day-case rates and long-term outcomes; and (ii) define the current anaesthetic preferences and day-case rates for surgeons across Wales.

Patients and Methods

We performed a retrospective review of all adult inguinal hernia repairs performed over a 9-year period (1995–2004) under the care of one consultant surgeon.

Table 1 Use of local anaesthesia and day-case rates in specialist hernia centres and public hospitals with interest in hernia surgery

Centre	% of LA	No. of cases	Day cases
Lichtenstein Hernia Institute ^{13,14}	100%	> 5000	99%
British Hernia Centre ^{8,9}	100%	> 4000	100%
Shouldice Hospital ^{15,16}	97%	> 25,000	0% (in-patients)
The Hernia Centre New Jersey ^{17,18}	0%	> 6000	No data available
Plymouth Hernia Centre ¹⁰	88%	1000	81%

The data were collected retrospectively by case-note review and included demographics, ASA grade, technique of repair and early complications. The early outcome measures were postoperative analgesia, day-case rates, and early complications including wound infection, haematoma, urinary retention, and unplanned re-admissions. The long-term outcome measures were chronic groin pain and recurrence. Data regarding chronic groin pain were obtained by a postal questionnaire. The postoperative pain was graded into no pain, very mild, mild, severe and very severe categories. The character of the pain, associated numbness, as well as restriction of activities was ascertained. Degree of satisfaction was assessed according to the scale dissatisfied, satisfied and highly satisfied.

Indications for surgery were indirect inguinal hernias and symptomatic direct inguinal hernias. Surgery was also offered where there was difficulty in differentiating direct and indirect hernias. No patients who requested hernia repair were denied surgery. The patients were grouped into different ASA grades prior to surgery based on the co-morbidity of the patient. The patients were offered the choice of LA or GA at their out-patient's appointment and those who requested GA had to undergo further anaesthetic assessment prior to surgery. The only absolute indication for surgery to be performed as an in-patient was if the patients were living alone.

The local anaesthetic procedure was explained to the patient by the operating surgeon. ASA grades 1 and 2 patients underwent surgery under pulse oximetry monitoring. For ASA grades 3 and 4 patients, surgery was performed in the presence of an anaesthetist.

Surgical technique

The anaesthetic mixture used for local anaesthetic repair consisted of 20 ml of 2% lignocaine with 1:200,000 adrenaline (Hameln, UK), 30 ml of 0.5% bupivacaine with 1:200,000 adrenaline (Astrazeneca, UK) and 50 ml of 0.9% saline. To buffer the lignocaine, 6 ml of 8.4% sodium bicarbonate (Fresenius, UK) was added, giving a pH of 7.0.

The surgical techniques employed were Lichtenstein repair,¹¹ PHS repair¹² and mesh plug repair with onlay mesh. In patients with a large defect and a wide internal ring, a combination of mesh and mesh plug were used. The mesh plug was fashioned from a flat polypropylene mesh (6 cm x 11 cm); the shape of the mesh plug was maintained by a 1 nylon suture placed through the mesh about 1 cm away from the apex of the mesh plug. The plug was then placed in the internal ring and fixed to the margins using a single 1 nylon stitch. In all cases, the mesh was soaked in iodine antiseptic prior to the tension free mesh repair. Marcaine (10 ml of 0.5% solution) was infiltrated into the wound at the end of the procedure in patients who underwent a GA repair.

Postal questionnaire

A postal questionnaire survey of all consultant surgeons in Wales was performed. A structured postal questionnaire was sent to all the members of the Welsh Surgical Society asking about their anaesthetic preferences for inguinal hernia repair, the percentage of cases performed under each anaesthesia and the number of cases performed as day cases.

Statistical analysis

Statistical analysis was performed using SPSS software (SPSS, Chicago, IL, USA). Chi-square test was used to compare the day-case rates, early and late complications between LA and GA. Fisher's exact test was used to compare chronic groin pain and discomfort.

Results

A total of 577 patients underwent inguinal hernia repair during the study period. The median age was 60 years (range, 17–93 years). The median body mass index (BMI) was 27 kg/m² (range, 20–41 kg/m²). Of the study group, 369 (64%) patients underwent surgery under local anaesthesia and 208 (36%) patients under general anaesthesia. The

Table 2 Patient characteristics

	Local anaesthesia	General anaesthesia	<i>P</i> -value
Age (years)	62 (range, 18–82)	53 (range, 17–87)	0.33
Males	355 (96.2%)	197 (94.7%)	0.4
BMI (mg/km ²)	27 (range, 20–38)	27.3 (range, 21–41)	0.53
Hernia			
Indirect	250	129	0.105
Direct	110	68	
Both	9	11	
ASA Grade			
1	111	94	< 0.05
2	132	82	< 0.05
3	101	28	> 0.05
4	25	4	> 0.05
Hernia			
Primary	356	183	< 0.05
Recurrent	13	25	

patient characteristics for each anaesthetic technique are summarised in Table 2. The majority of the patients were ASA grades 1 and 2 (72%) with ASA grades 3 and 4 patients accounting for 28% of all patients. The median age of patients in ASA grades 1 and 2 was 55.5 years (range, 17–90 years) and in ASA grades 3 and 4 was 72 years (range, 21–93 years; $P > 0.05$). Lichtenstein mesh repair was the most common surgical technique used followed by PHS mesh (Prolene Hernia System, Ethicon, Inc.) repair and mesh and mesh plug repair (Table 3).

Three patients undergoing surgery performed by surgical registrars required conversion from a LA repair to GA due to patient anxiety. The mean volume of local anaesthetic solution used was 60 ml (range, 25–100 ml). Patients undergoing surgery under local anaesthesia had lower postoperative analgesic requirements compared with the general anaesthesia group ($P < 0.05$).

The day-case repair rates, early complications and recurrences are summarised in Table 4. The day-case rates were significantly higher when patients underwent surgery under LA compared to GA (82.6% versus 42.6%). The incidence of urinary retention was higher in the GA group ($P < 0.05$). There were 17 (2.9%) re-admissions overall. The reasons for re-admission included haematoma ($n = 6$), severe pain ($n = 4$), infection ($n = 3$), fainting ($n = 2$) and urinary retention ($n = 2$).

One patient who underwent surgery under LA developed a femoral nerve palsy postoperatively which resolved spontaneously. Seven patients developed superficial wound infection following surgery, one of whom required admission for

administration of intravenous antibiotics. No patient required removal of the mesh for infection and there were no abscesses. The reasons for overnight admission are summarised in Table 5. The long-term recurrence rate was 1.2% and there was no statistically significant difference between GA and LA groups.

There was a 64.6% response rate for the postal questionnaire (Table 6). The incidence of chronic groin pain was 27.6%. The majority of the patients complained of very mild to mild chronic groin pain (78.6%). Of patients, 37.2% complained of discomfort in the groin in various forms including aching (38%), numbness (32.3%), shooting pain (15.8%) and burning (13.6%). Patients undergoing surgery under GA had a higher incidence of aching pain compared to LA group ($P < 0.05$). Of patients, 6.7% ($n = 7$) had to take time off work because of chronic groin pain. About half of the patients had no restriction of any daily activities secondary to

Table 3 Surgical techniques employed

Technique	Local anaesthesia ($n = 369$)	General anaesthesia ($n = 208$)
Lichtenstein	288	182
PHSE	70	23
Mesh and mesh plug	11	3

Table 4 Postoperative analgesia, day-case rates, early complications and recurrence

	Local anaesthesia (<i>n</i> = 369)	General anaesthesia (<i>n</i> = 208)	<i>P</i> -value
Postoperative analgesia	Median 0 SD $\pm$ 0.92 Range (0–6)	Median 0 SD $\pm$ 1.55 Range (0–6)	< 0.05
Day cases	305 (82.6%)	95 (45.6%)	< 0.05
Postoperative complications			
Haematoma	15 (4%)	7 (3.3%)	0.63
Urinary retention	2 (0.5%)	5 (2.4%)	0.05
Wound infection	5 (1.3%)	2 (0.9%)	0.67
Recurrence	4 (1%)	3 (1.4%)	0.70
Re-admission	10 (2.7%)	7 (3.3%)	0.65
Postoperative hydrocoele	2 (0.5%)	1 (0.4%)	0.92

chronic groin pain while the other half complained of groin pain while performing various activities including walking, sport, lifting and exercise.

Satisfaction scores revealed a higher number of highly satisfied and satisfied patients in the LA group compared with the GA group (Table 6). The number of patients dissatisfied with the procedure was higher in the general anaesthetic group (Table 6). Of patients who underwent surgery under general anaesthesia, 85.5% would undergo surgery under GA again if they needed surgery on the opposite side. Of patients undergoing surgery under LA, 94.1% would undergo surgery under LA again if needed on the opposite side.

There was a 70% response rate to the postal questionnaire sent to consultant surgeons in Wales. Of respondents,

70% sometimes perform inguinal hernia repair under local anaesthesia but only 15% of surgeons offer the majority of their patients local anaesthetic repair. Only 66% of surgeons perform more than 30% of repairs as day-case procedures.

Discussion

This study demonstrates that results similar to specialist hernia centres can be achieved in district general hospitals

Table 5 Reasons for overnight stay

Causative factor	Number of patients (<i>n</i> = 176)
Social admission (living alone)	96 (60.2%)
Postoperative pain	24 (13.6%)
Nausea and vomiting	21 (11.9%)
Haematoma	16 (9%)
Chest pain	9 (5.1%)
Urinary retention	6 (3.4%)
Seroma	2 (1.1%)
Femoral nerve palsy	1 (0.5%)
Newly diagnosed diabetic	1 (0.5%)

Table 6 Postal questionnaire survey results

	Local anaes. 239 (64.7%)	General anaes. 134 (64.4%)	<i>P</i> -value
Chronic groin pain	61 (25.5%)	42 (31.3%)	> 0.05
Very mild	23 (37.7%)	18 (49%)	> 0.05
Mild	27 (44%)	13 (31%)	> 0.05
Severe	7 (11.4%)	11 (26%)	> 0.05
Very severe	4 (6.5%)	0	> 0.05
Discomfort	77 (42%)	62 (50%)	> 0.05
Aching	25 (32.4%)	28 (45%)	< 0.05
Numbness	28 (36.3%)	17 (27.4%)	> 0.05
Shooting pain	12 (15.5%)	10 (16.1%)	> 0.05
Burning	12 (15.5%)	7 (11.2%)	> 0.05
Satisfaction scores			
Dissatisfied	13 (5.4%)	14 (10.4%)	< 0.05
Satisfied	66 (27.6%)	59 (44%)	< 0.05
Highly satisfied	160 (66.9%)	61 (45%)	< 0.05

Table 7 Use of local and general anaesthesia and day-case rates in Europe

	Local anaesthesia	General anaesthesia	Day cases
England ²⁵	6%	89%	41%
Scotland ²⁴	6%	85%	22%
Denmark ²⁶	18%	63%	59%
Sweden ²⁷	11%	50%	70%

in terms of use of local anaesthesia, early and late complications and long-term recurrence. A local anaesthetic repair results in better satisfaction rates compared to general anaesthetic repair and improves day-case rates.

Specialist hernia centres both in the UK (British Hernia Centre) and North America (Shouldice Clinic, Lichtenstein Hernia Institute and The Hernia Center in New Jersey) have achieved excellent results in terms of day-case rates and long-term recurrence and set the standards for inguinal hernia repair (Table 1).^{8,9,15–18} However, such results were never reproducible in district general hospitals in the UK where inguinal hernia repair is one of the most commonly performed procedures. Previous studies across Britain have emphasised this fact.^{19–22}

The Royal College of Surgeons of England guidelines on inguinal hernia repair in 1993 suggested that at least 30% of inguinal hernia repairs should be performed as day-case procedures.²³ The UK-wide, day-case rates for inguinal hernia repair in 2003 were around 20%.¹⁰ One reason for near to 100% day-case rates achieved by specialist hernia centres is employment of local anaesthesia. Previous studies have revealed that, in the UK, only 5–10% of inguinal hernias undergo surgery under local anaesthesia with the majority of cases being repaired under general anaesthesia (60–70%) and regional anaesthesia (10–20%).^{24,25} Interestingly, the low utilisation of local anaesthesia for inguinal hernia repair was noticed across Europe (Table 7).^{26,27} In this series, 64% of the hernias underwent surgery using local anaesthesia and a day-case rate of around 83% was achieved while general anaesthetic repair resulted in a day-case rate of 46%.

The incidence of inguinal herniation is high in the elderly aged over 65 years.²⁸ They have complex medical problems increasing the risk of surgery and make them unsuitable for day-case repair.²⁹ Patients with co-existing illness and poor ASA grades (3 and 4) are often excluded in randomised studies when comparing day-case rates and different anaesthetic techniques,^{30,31} and minimal data are available regarding their suitability for day-case repair. Our experience has suggested that, by using local anaesthesia,

ASA grade 3 and 4 patients can undergo day-case hernia repair with similar complication and re-admission rates to ASA grade 1 and 2 patients.³²

A commonly perceived problem of local anaesthetic inguinal hernia repair is the pain of infiltration. This can be extreme enough for patients to be dissatisfied with the procedure³³ and decline further local anaesthetic surgery.³⁴ Our own experience has shown that addition of sodium bicarbonate to buffer local anaesthetic solution significantly reduces the perceived pain of inguinal hernia repair, both during the administration of the local anaesthetic solution and during the procedure itself.³⁵ Buffered local anaesthetic solution is associated with a higher level of patient satisfaction.³⁵

A potential problem of local anaesthetic inguinal hernia repair is toxicity especially in obese patients who require large volumes. The local anaesthetic mixture used in this study allowed us to use large volumes of the solution especially necessary for obese patients (the median BMI of the study group was 27.3 kg/m²).

There was no statistically significant difference in the incidence of complications between the two study groups except for the higher incidence of urinary retention in the GA group compared to LA group. Comparison of general and local anaesthesia either in randomised^{36,37} or non-randomised studies^{38,39} has shown a similar incidence of urinary retention between local and general anaesthesia in all but one study.³⁹ A large review of post herniorrhaphy urinary retention suggests that the incidence of urinary retention is lower with local anaesthetic inguinal hernia repair compared to general and regional anaesthesia.⁴⁰

There was no statistically significant difference in the incidence of chronic groin pain between the general and local anaesthetic groups. However, there were more patients complaining of aching sensation in the general anaesthetic group compared to local anaesthetic group. Interestingly, in the literature there were no reported randomised or non-randomised studies comparing the incidence of chronic groin pain between general and local anaesthesia. However, results from specialist centres have shown a very low incidence of chronic groin pain following a local anaesthetic inguinal hernia repair (1% at 1-year follow-up).^{8,9}

The long-term recurrence rates obtained with LA in this study were comparable with specialist hernia centres (1%). The national figures for recurrence rates in the UK range from 5% to 15% for primary inguinal hernias.⁴¹ The data regarding long-term recurrence in this study were obtained by case-note review, GP records and postal questionnaire survey. This might be one of the weaknesses of this study but large scale data regarding recurrence even in specialist hernia centres were obtained by postal questionnaire.^{8,9}

Previous surveys conducted in Wales have shown a very low utilisation of local anaesthesia for inguinal hernia

repair.^{21,42} The results from this study have shown that the use of local anaesthesia is still very low. Currently, only two-thirds of surgeons in Wales are achieving the 30% of target set by The Royal College of Surgeons of England.

The most recent Department of Health targets suggest that 75% of all elective procedures should be performed as day-case procedures;⁴³ however, no health trusts are meeting the 75% target set by the Government.⁴⁵ Approximately 80,000 inguinal hernia repairs are performed every year in the UK, in spite of recent evidence suggesting local anaesthetic inguinal hernia repair provides best possible outcome to the patients,^{26,44} there is little evidence of increased use of local anaesthesia across the National Health Service.

Conclusions

This study demonstrates that the use of LA results in increased day-case rates, lower postoperative analgesic requirements and fewer micturition problems. The excellent results obtained by specialist hernia centres can be reproduced by district general hospitals by increasing the use of LA to repair inguinal hernias. There is a need to increase the use of local anaesthesia for inguinal hernia repair across the UK in accordance with recent evidence.

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