

A United Kingdom survey of surgical technique and handling practice of inguinal canal structures during hernia surgery

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Background. Recent trials have assessed the impact of elective nerve division on patient outcome after inguinal herniorrhaphy. The aim of this study was to establish UK surgical practice of handling of structures in the inguinal canal during herniorrhaphy.

Methods. A cross-sectional survey of all Fellows ($n = 1113$) of the Association of Surgeons of Great Britain and Ireland (ASGBI) was performed. The main outcomes were to determine method of inguinal hernia repair and routine practice for intra-operative handling of structures in the inguinal canal.

Results. A total of 852 (77%) questionnaires were returned, of which 784 (92%) surgeons performed inguinal herniorrhaphy. Approximately two-thirds (63%) of responding surgeons performed less than 50 procedures per annum and 37% conducted more than 50 procedures annually. Mesh was the preferred method used by 90% of surgeons; 6% used non-mesh, and 4% used other (laparoscopic) methods. Routine practice in relation to the inguinal structures varied by volume of hernia surgery; surgeons who conducted more than 50 procedures annually were more likely to visualize and preserve inguinal nerve structures. However, inconsistency in the answers suggested confusion over anatomy.

Conclusion. This is the first UK survey to investigate method of hernia repair and usual handling practice of inguinal canal structures. There was wide acceptance of the use of mesh in inguinal hernia repair, with the majority of UK surgeons favoring an open approach. Surgeons performing high volumes of herniorrhaphy were more likely to preserve, rather than transect, inguinal nerve structures. This variation in practice may confound assessment of long-term neuralgia and other post-herniorrhaphy pain syndromes. (*Surgery* 2006;139:523-6.)

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CHRONIC GROIN PAIN and testicular atrophy are well-recognized complications of inguinal hernia operations.^{1,2} Various etiologic mechanisms have been proposed for the development of chronic postherniorrhaphy pain, including impaired vascularity and damage to 1 of the 3 primary nerves in the inguinal canal, the ilioinguinal, iliohypogastric, or genitofemoral nerve. Nerve trauma, contributing

to persistent neuralgia and sensory loss, can be due to partial or complete nerve division, stretching, contusion, crushing, electrical damage, entrapment, or compression from sutures.²⁻⁴

Although many variations in surgical technique for inguinal herniorrhaphy have been developed over time, no technique is immune to such complications. Current evidence suggests that laparoscopic operations are associated with lower prevalence of chronic pain and persistent numbness than open hernia repair, although few studies have assessed chronic pain as a primary postoperative outcome.^{5,6} The ilioinguinal nerve usually is preserved during hernia repair, although it has been suggested that careful preservation is associated with an increase in chronic groin pain.² One recent trial reported substantial sensory disturbances after elective division of the ilioinguinal nerve, but no increase in incidence of chronic pain, compared with nerve preservation.⁷ Little is

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Table. Routine practice of dealing with inguinal structures by 707 UK surgeons performing open mesh repair

	<i>Not routinely visualized</i> N (%)	<i>Divide</i> N (%)	<i>Preserve</i> N (%)	<i>Practice varies</i> N (%)	<i>No response</i> N (%)
Ilioinguinal nerve	51 (7)	54 (7)	572 (81)	23 (3)	7 (1)
Iliohypogastric nerve	299 (42)	36 (5)	347 (49)	14 (2)	11 (2)
Genital branch of the genitofemoral nerve	396 (56)	46 (6)	242 (34)	11 (2)	12 (2)
Cremasteric vessels	73 (10)	333 (47)	272 (39)	16 (2)	13 (2)

known about current practice among surgeons in the United Kingdom (UK) and whether nerves routinely are divided or preserved during inguinal herniorrhaphy.⁸ The aim of this study, therefore, was to investigate the usual method of inguinal hernia repair by UK surgeons with regard to their handling of nerves and vessels in the inguinal canal.

METHODS

A cross-sectional study design was used, whereby a postal questionnaire survey was conducted of the 1113 fellows of the Association of Surgeons of Great Britain and Ireland (ASGBI) in 2003. A questionnaire was developed to record the annual surgical volume and the preferred surgical method, securing method, and usual practice for handling specific nerve and vessel structures in the inguinal canal (Appendix). This study was piloted among local surgeons; the final questionnaire was shortened to a postcard format to maximize response rate.⁹ A single reminder was sent after 3 weeks to nonresponders. Data were entered into Microsoft Access, and validation of accuracy of data entry was checked on a 10% sample. Statistical analysis was performed with the use of the Statistical Package for the Social Sciences (SPSS, version 11.0; SPSS, Inc, Chicago, Ill). Differences between groups were analyzed by using χ^2 for trend, as appropriate. A value of $P < .05$ was considered statistically significant.

RESULTS

A total of 1113 questionnaires were sent, and 852 (77%) responses were received after 1 reminder. Of these, 68 (8%) surgeons stated they did not perform elective operations for inguinal hernia and were excluded from analysis. Results are presented for the remaining 784 respondents. Of these, 237 (30%) performed less than 25 procedures per year, 256 (33%) performed between 25 and 50 procedures annually, and 290 (37%) surgeons conducted more than 50 procedures per year. More than two thirds of surgeons ($n = 564$) specified an approximate figure for annual hernia operations, whereas

220 surgeons (28%) retrieved the annual number of operations from a computerized database. Surgeons who conducted higher numbers of hernia operations were more likely to provide an accurate figure from a database ($n = 135/290$; 47%) than medium- ($n = 56/256$; 22%) or low-volume surgeons ($n = 29/237$; 12%) (χ^2 test for trend; $P < .001$).

Mesh was the preferred surgical technique of 707 (90%) of responding surgeons; 46 (6%) used nonmesh, and the remaining 31 (4%) used other methods, most commonly laparoscopic totally extraperitoneal or transabdominal preperitoneal repairs. No association was found between preferred method and number of operations (χ^2 for trend; $P = .17$). Of the 707 surgeons whose preferred method was mesh, 558 (79%) secured mesh using nonabsorbable sutures, 62 (9%) used absorbable sutures, 55 (8%) used staples, and 21 (3%) used nonabsorbable sutures and staples; 10 (1%) reported "none" and 1 surgeon failed to answer.

There was considerable variation with regard to routine practice when dealing with structures in the inguinal canal (Table). The ilioinguinal nerve was identified routinely by the majority of surgeons (88%) and routinely divided by 7%. There was no difference in routine division or preservation by number of operations per year (<25 procedures per year; 25 to 50; >50 procedures per year; χ^2 test for trend, $P = .08$). The iliohypogastric nerve was visualized routinely by 58% of surgeons and divided routinely by 5%. Surgeons who conducted high numbers of inguinal herniorrhaphies (>50 per year) were more likely to visualize and preserve the iliohypogastric nerve (57%) than surgeons conducting 25 to 50 (52%) or less than 25 procedures per year (42%) (χ^2 test for trend $P = .01$). Similarly, surgeons who conducted >50 procedures per year were more likely to preserve the genital branch of the genitofemoral nerve (42%) than surgeons conducting 25 to 50 (35%) or >25 procedures (29%) annually (χ^2 test for trend $P = .02$).

Practice varied over handling of the cremasteric vessels, with 333 (47%) of surgeons performing

mesh usually dividing the vessels. Only 46 (6%) of all surgeons performing mesh repair stated that they routinely divided the genital branch of the genitofemoral nerve. Of the 333 surgeons reporting routine division of the cremasteric vessels, 178 (54%) stated they did not visualize routinely the genitofemoral nerve, 104 (31%) reported they routinely preserved the nerve, and 38 (11%) surgeons divided the genitofemoral nerve.

DISCUSSION

This is a national UK survey to investigate how surgeons deal routinely with inguinal nerves and vessels during hernia repair. Our findings are based on surgeons who were registered fellows with the ASGBI in 2003 and, thus, may not be representative of all surgeons performing hernia operations in the UK. Currently, no consensus exists regarding intraoperative handling of nerves and vessels, and we found considerable variation in routine surgical practice, particularly related to the annual volume of herniorrhaphies performed.

The anatomy of the nerves in the inguinal canal is variable with an inverse relationship between the size of the iliohypogastric and ilioinguinal nerves. The former passes through the internal oblique muscle above the deep inguinal ring, and the latter courses with the spermatic cord in the inguinal canal. The genital branch of the genitofemoral nerve passes through the internal ring and runs within the layers of the cord on the inferior aspect adjacent to the cremasteric vessels. The small size and proximity of the genital branch to the cremasteric vessels is such that division of the vessels will usually cause sacrifice of the nerve. Surgeons reporting routine division of cremasteric vessels, but routine preservation of the genitofemoral nerve, are either exceptionally meticulous operators or have a poor grasp of groin anatomy.

Neuropathic pain usually develops in the sensory distribution of an injured nerve, and chronic residual neuralgia can result from operative handling of sensory nerves. The 3 sensory nerves in the inguinal region often are implicated in the genesis of postherniorrhaphy neuralgia. Although the ilioinguinal nerve usually is preserved, it may be crushed, partially divided, or injured intraoperatively by cautery, leading to sensory loss and chronic pain. Nerves are at risk of adherence to or abrasion against mesh used for hernia repair, compared with suture repair.¹⁰ In laparoscopic repair, the wall of the inguinal canal is at risk of penetration when mesh is stapled, and nerves can also be kinked, causing chronic irritation. Reduced numbness reported after laparoscopic repair

might reflect the limited dissection involved in the laparoscopic approach, but also the avoidance of trauma to the ilioinguinal and iliohypogastric nerves.¹¹

Most studies investigating risk factors associated with the development of chronic postoperative pain and numbness have focused on patient risk factors, such as age, body mass index, and reoperations.^{6,12} Only 3 studies have assessed the impact of elective neurectomy during open inguinal hernia repair. Two reported no association with chronic postoperative pain; however, they were small pilot studies, which were underpowered to detect statistically significant effects.^{7,13} In a recent randomized controlled trial comparing elective preservation and division of the ilioinguinal nerve, Picchio et al¹⁴ reported similar incidences of pain, but a significantly greater incidence of sensory disturbances in the transection group at 1 year postoperatively.

The purpose of our small study was to determine the usual practice of handling the inguinal nerves during inguinal herniorrhaphy. Although we found that the majority of responding surgeons routinely preserved the ilioinguinal nerve, there were marked differences in dealing with the cremasteric vessels. Half of surgeons reported that they routinely divided these vessels without apparently recognizing the coincidental sacrifice of the genital branch of the genitofemoral nerve. Wantz² has suggested that disruption of the cremasteric vasculature could lead to gonadal atrophy and persistent pain. Further trials are required in different settings to identify whether the findings by Picchio are generalizable and to assess the impact of routine division or preservation of the other inguinal structures.

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APPENDIX. Inguinal hernia repair questionnaire

1. Do you perform elective inguinal hernia surgery?

Yes
No

If no, please do not proceed any further and return the questionnaire. Thank you for your help.

2. How many hernia procedures do you perform annually?

Less than 10
11-25
26-50
> 50

3. Is this figure an approximation or taken from a computerized database?

Approximate number
From a computer

4. What is your preferred method?

Mesh
Nonmesh
Other—please specify below

5. If you use mesh, what do you secure the mesh with?

None
Non absorbable sutures
Absorbable sutures
Staples
Other—please specify below

6. Please specify how you routinely deal with the following structures?

	Not routinely visualized	Divide	Preserve
Ilioinguinal nerve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Iliohypogastric nerve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Genital branch of genitofemoral nerve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cremasteric vessels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments section

Thank you for your help with this survey.