

Determinant factors of pain after ambulatory inguinal herniorrhaphy: a multi-variate analysis

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Abstract: Pain is common after inguinal herniorrhaphy. The objective of our study was to evaluate the significance of various clinical factors on the level of post-operative pain after ambulatory inguinal herniorrhaphy. Between January, 1996 and December, 1998, 239 ambulatory inguinal hernia repair patients were recruited. Operative techniques included nylon darn (n = 152), modified Bassini repair (n = 56), and prolene mesh hernioplasty (n = 30). Linear analogue pain scores – ranging in value from 0 to 10 – were assessed by telephone interviews on the first and third post-operative days. Uni-variate and multi-variate analyses were performed to identify the significant independent determinant factors affecting the severity of post-operative pain. Clinical factors studied were age, sex, operative technique, hernia anatomy and post-operative complication(s). By uni-variate analysis, patients of age ≤ 50 years and indirect inguinal hernia were associated with a significantly higher pain score on the first postoperative day 1. On post-operative day 3, patients of age ≤ 50 years, with an indirect inguinal hernia and modified Bassini repair reported a significantly higher pain score. Following inguinal herniorrhaphy, multiple regression analysis showed that age was the only independent predictive factor of pain score on post-operative days 1 and 3. In conclusion, post-operative pain was not affected by surgical technique, sex, hernia anatomy and post-operative morbidity. Only age had a significant influence on the post-operative pain score following ambulatory inguinal herniorrhaphy. Therefore, the age of a patient should be taken into consideration when prescribing post-operative analgesics.

Key words: Post-operative pain – Inguinal hernia – Age

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Pain is the most common discomfort experienced by patients after ambulatory inguinal herniorrhaphy. Numerous studies have been conducted to evaluate

various techniques to reduce pain after inguinal hernia repairs [Callesen 1997, Johansson 1997, Spittal 1992]. However, few studies have been done to assess the

significance of post-operative clinical variables on the severity of pain after inguinal herniorrhaphy. It is commonly believed that post-operative pain is

more prominent following indirect inguinal hernia repair than those following direct inguinal herniorrhaphies. However, this hypothesis has not been proven.

We conducted the present study at our Day Surgery Centre to evaluate the impact of various clinical factors on the severity of post-operative pain in patients who underwent ambulatory inguinal herniorrhaphies. The factors included sex, age, operative technique, hernia anatomy, and post-operative morbidity.

Patients and methods

Between January, 1996 to December, 1998, 262 ambulatory inguinal herniorrhaphies were performed at the Day Surgery Centre, Tung Wah Hospital, University of Hong Kong Medical Centre. All the patients' records were reviewed retrospectively. All of the operations were carried out by staff surgeons under general anaesthesia. Operative techniques included nylon darn, modified Bassini repair, and prolene mesh hernioplasty. For indirect inguinal hernia, high ligation and extirpation of the peritoneal sac was routinely performed. For direct inguinal hernia, the sac was inver-

ted and plicated with 2/0 Prolene suture. All patients had post-incisional local infiltration of the wound with 10ml 0.5% Marcaine.

After assessment by the operating surgeon and the anaesthetist, the patients were discharged during the afternoon of surgery date. All of the patients had identical post-operative management. A supply of oral dextropropoxyphene 32.5 mg and voltaren suppository 50mg for analgesia was given upon discharge. Telephone follow-up was performed on post-operative days one and 3 to document the maximum pain score on a linear analogue scale from zero to 10. Two weeks after the patients were discharged, follow-up was done on all of the patients at our Surgical Clinic.

Patients with follow-up data on clinical outcome and post-operative pain score were recruited for analysis. Clinicopathologic factors studied ($n = 5$) were age, sex, hernia anatomy, operative technique, and post-operative complication. Statistical comparison of the post-operative pain scores was analyzed by Student's t-test and one-way analysis of variance (ANOVA) with respect to the 5 clinicopathologic variables. Significant factors were then entered into multiple

regression analysis to identify the independent predictive factor causing post-operative pain. Statistical analysis was performed with the help of computer software (SPSS/PC + 7.0, SPSS, Chicago, Illinois, USA). A P value of less than 0.05 was considered statistically significant.

Results

Patient demographics

A total of 239 patients were recruited into the present study. Twenty-three patients were excluded from the present study because of the absence of follow-up data or incomplete records. The mean age of the study population was 48 ± 16 S.D. years. There were 18 women and 221 men. Operative methods included nylon darn ($n = 152$), modified Bassini repair ($n = 54$), open mesh hernioplasty ($n = 30$), iliopubic tract repair ($n = 2$), and herniotomy with Lytle's procedure ($n = 1$). The types of hernia were indirect inguinal hernia ($n = 158$), direct inguinal hernia ($n = 67$), pantaloon inguinal hernia ($n = 7$), sliding inguinal hernia ($n = 3$), recurrent direct inguinal hernia ($n = 3$), and bilateral direct inguinal hernia ($n = 1$).

Table 1. Comparison of post-operative day one pain score among different clinical variables

Clinical variables	Post-operative pain on D1	p
Age		$< 0.01^a$
Age ≤ 50 years ($n = 112$)	4.1 ± 0.18	
Age > 50 years ($n = 123$)	2.9 ± 0.16	
Sex		0.41^a
Male ($n = 218$)	3.4 ± 0.13	
Female ($n = 17$)	3.8 ± 0.44	
Hernia anatomy		$< 0.01^a$
Indirect ($n = 156$)	3.7 ± 0.16	
Direct ($n = 66$)	2.8 ± 0.21	
Operative technique		0.33^b
Nylon Darn ($n = 150$)	3.5 ± 0.16	
Modified Bassini ($n = 52$)	3.6 ± 0.27	
Mesh hernioplasty ($n = 30$)	3.0 ± 0.30	
Post-operative morbidity		0.07^a
Uneventful ($n = 221$)	3.4 ± 0.13	
Complication ($n = 14$)	4.4 ± 0.48	

Figures represent mean \pm S.E.M.; ^a Student's t-test; ^b ANOVA

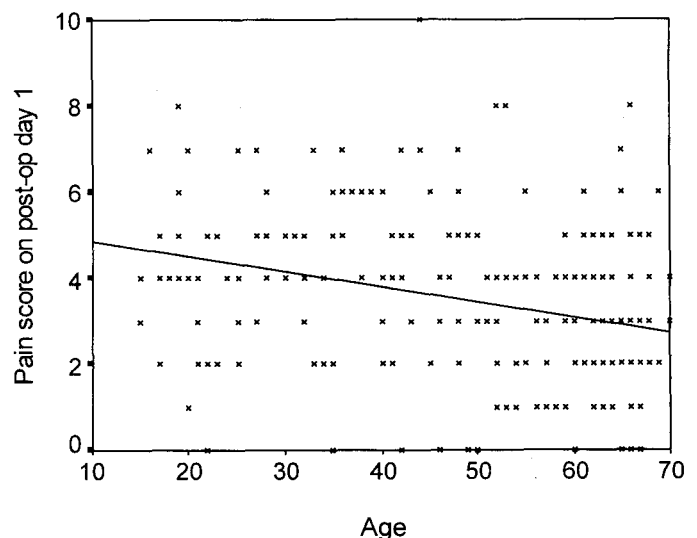


Fig. 1

A scatterplot showing the association of age and post-operative pain score on day 1. Pearson correlation = -0.29 , $P < 0.001$

Operative outcome

Of the study population (n = 239), all but 5 patients were discharged on the day of the operation. The reasons for hospital admission included pain (n = 2), dizziness (n = 2), and hyperglycaemia (n = 1). All 5 patients were discharged within two days.

Post-operative complications (n = 14) included wound bruising (n = 3), haematoma (n = 2), wound abscess (n = 2), scrotal swelling (n = 2), cellulitis (n = 1), acute retention of urine (n = 1), fever (n = 1), pulmonary tuberculosis (n = 1), and reactivation of hepatitis (n = 1). The post-operative morbidity rate was 6%. Two patients were readmitted because of fever (n = 1) and retention of urine (n = 1).

Pain score analysis on post-operative day 1

The overall mean pain score was 3.9 ± 0.12 (S.E.M.) on post-operative day one. Table 1 shows the mean pain score in the different subgroups of the patients. Age of less than 51 years and indirect inguinal hernia were associated with a significantly higher pain score. On multiple regression analysis, age was the only independent factor affecting the pain score on the first day after inguinal her-

niorrhaphy. Fig. 1 shows the statistically significant inverse correlation between age and post-operative pain score on day one.

Pain score analysis on post-operative day 3

The overall mean pain score was 1.9 ± 0.11 (S.E.M.) on post-operative day 3. Table 2 compares the mean pain score in the different subgroups of the patients. Age of less than 51 years, indirect inguinal hernia, and modified Bassini repair were associated with a significantly higher pain score. On multiple regression analysis, age remained the only independent factor influencing the pain score on the third day after inguinal herniorrhaphy. Fig. 2 shows a significant negative correlation between age and post-operative pain score on day 3.

Discussion

The present study demonstrated that age was the only significant determinant factor of pain after inguinal herniorrhaphy. This is in accordance with the findings by Callesen [1998] who reported a higher function-related pain in young patients than in elderly patients after different surgical techniques of inguinal hernia repair. Bellville [1971] performed

a stepwise regression analysis of clinical variables on acute post-operative pain in more than 700 patients. Age was found to be the most important variable in determining the degree of pain relief. Many hypotheses have been put forward to explain this phenomenon, including diminished pain receptors and reduction in the clearance of analgesic from the body in the elderly [Moore 1990, Ready 1987, Veering 1987]. On the contrary, it could be due to a higher level of physical activity, a lower pain threshold or a more critical expectation for the post-operative course in young patients [Callesen 1998]. Analgesic therapy after inguinal herniorrhaphy should thus be adjusted in accordance with the age of patients.

A higher pain score was noted in patients after indirect inguinal hernia repairs. High ligation of the peritoneal sac in indirect inguinal hernia has been suggested to be the underlying reason in view of the pain-sensitive nature of peritoneum [Smedberg 1984]. During the operative dissection of the indirect hernial sac from the spermatic cord, pain fibres, including genitofemoral and ilioinguinal nerves, could have been involved as well. Simple invagination of the peritoneal sac without extirpation has therefore been advocated to reduce

Table 2. Comparison of post-operative day 3 pain score among different clinical variables

Clinical variables	Post-operative pain on D3	p
Age		0.01 ^a
Age ≤ 50 years (n = 105)	2.2 ± 0.16	
Age > 50 years (n = 105)	1.6 ± 0.13	
Sex		0.11 ^a
Male (n = 193)	1.8 ± 0.10	
Female (n = 17)	2.8 ± 0.57	
Hernia anatomy		<
0.01 ^a		
Indirect (n = 149)	2.1 ± 0.13	
Direct (n = 52)	1.5 ± 0.18	
Operative technique		0.04 ^b
Nylon Darn (n = 142)	1.8 ± 0.13	
Modified Bassini (n = 40)	2.5 ± 0.25	
Mesh hernioplasty (n = 26)	1.8 ± 0.24	
Post-operative morbidity		0.18 ^a
Uneventful (n = 198)	1.9 ± 0.11	
Complication (n = 12)	2.4 ± 0.36	

Figures represent mean (S.E.M.); ^a Student's t-test; ^b ANOVA

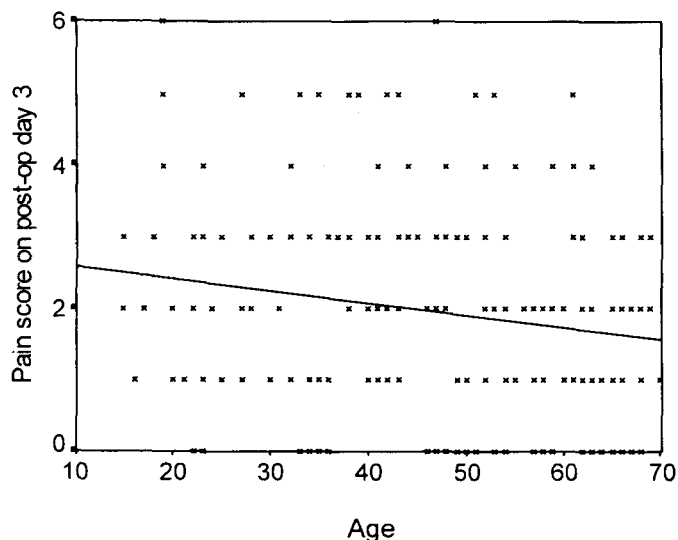


Fig. 2 A scatterplot showing the association of age and post-operative pain score on day 3. Pearson correlation = -0.17, P = 0.01.

post-operative pain [Lichtenstein 1989]. However, no prospective study has been conducted to confirm the significance of peritoneal sac ligation and resection on post-operative pain. Above all, hernia anatomy was not an independent factor in determining post-operative pain levels in a multivariate analysis. Hernia anatomy was probably a confounding factor influencing the pain score analysis. The higher pain score following indirect inguinal herniorrhaphy could have resulted from a higher incidence of indirect inguinal hernia in young patients.

Laparoscopic repair of inguinal hernia has been proven to confer less pain after operation [Filipi 1996, Juul 1999, Liem 1997, MRC Laparoscopic Groin Hernia Trial Group 1999]. However,

among the various techniques of open repair, few studies have shown any definite superiority of one technique over another on the level of post-operative pain [Callesen 1999, Kwaji 1999, Nehra 1995, Prior 1998]. Our findings were consistent with that of Callesen [1998, 1999] who showed no difference of post-operative pain among the different types of hernia and operative techniques. We believe that post-operative pain would be similar among the different open techniques, as long as the repair is tension-free.

Optimal pain control is pivotal to the success of ambulatory inguinal herniorrhaphy. Multimodal methods, with a combination of opioids, non-steroidal anti-inflammatory drugs and local

anaesthesia, currently appear to be the best options for achieving control [Kehlet 1993, Nehra 1995]. Stratification of patients into different age groups should be considered in studies of pain control after operation.

Conclusions

In summary, age is the only significant determinant factor of the post-operative pain score after inguinal herniorrhaphy. There was a significant inverse correlation between age and post-operative pain score. A more intensive pain relief regime should be considered in young patients.

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