



UvA-DARE (Digital Academic Repository)

The Lichtenstein inguinal hernia repair : applicability, antibiotic prophylaxis and complications

Aufenacker, T.J.

Publication date
2006

[Link to publication](#)

Citation for published version (APA):

Aufenacker, T. J. (2006). *The Lichtenstein inguinal hernia repair : applicability, antibiotic prophylaxis and complications*. [Thesis, externally prepared, Universiteit van Amsterdam].

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

Hernia surgery changes in the Amsterdam region 1994-2001

Decrease in operations for recurrent hernia

Chapter 2

Th.J. Aufenacker | D.H. de Lange | M.D. Burg | B.W. Kuiken |

E.F. Hensen | I.G. Schoots | D.J. Gouma | M.P. Simons

Abstract

Background: Inguinal hernia (IH) surgery has changed substantially in the past decade. Conventional (non-mesh) techniques have largely given way to prosthesis.

Objective: This study's aim was to analyse whether changes in technique used for IH repair influenced the operation rate for recurrence.

Methods: A retrospective study was performed of all adult males who had undergone IH surgery in the Amsterdam region during calendar years 1994, 1996, 1999 and 2001. Data were obtained for 3649 patients and included patient demographics, hernia type and surgical technique.

Results: We observed a decrease in the use of conventional techniques and a significant increase ($p < 0.05$) in the use of prosthetic materials. The number of operations performed for recurrent hernia decreased from 19.5% (216/1108) in 1994, to 16.8% (197/1170) in 1996, to 14.0% (152/1088) in 1999 and to 14.1% (40/283) in 2001. When comparing 1999 and 2001 with 1994 there was a significant decrease in operations performed for recurrent hernia ($p = 0.005$). There was also a significant increase in supervision of the surgical resident by a surgeon.

Conclusion: In the period from 1994 to 2001 we have seen a significant increase in the use of prosthesis for IH repair in adult males in the Amsterdam region. Surgical residents are receiving more attending surgeon supervision in the operating theatre. These two factors may explain the decrease in operations performed for recurrent IH from 19.5% to 14.1%.

Introduction

In the past decade extensive changes in inguinal hernia (IH) treatment have occurred. There has been a decrease in the use of conventional techniques (Bassini, Shouldice) and an increase in prosthetic use (Lichtenstein, Laparoscopic repair) as previously described by several authors.^{1,2,3}

This change has come about as surgeons seek to reduce IH recurrence rates. Several studies have reported high percentages of operations for recurrence in nationwide databases i.e. Sweden ('92-'96) 16-17%⁴, Sweden ('96-'98) 15%³, and Denmark ('98-'00) 17%.¹ In one study from Scotland ('98-'99)⁵ a low percentage of recurrent hernia (8%) was reported. Unfortunately, a reliable determination of recurrence after hernia surgery is difficult. This is due to the fact that a large group of long-term follow-up patients is needed and all these patients should be examined rather than simply questioned.⁶

Alternatively, an analysis of the number of operations for recurrent IH in a defined region over several years could be undertaken. This method was used for this study to describe IH surgery in a large region of The Netherlands. The reoperation rate for recurrent IH during a 2 to 5 year follow-up period captures approximately 50% of the actual recurrences since many remain asymptomatic. The true recurrence rate may then be obtained by doubling the reoperation rate.^{6,7}

We performed 4 reviews of IH repairs done in the Amsterdam region. The first was of 1994⁸ IH repairs when most were done with non-mesh techniques. A second review of 1996⁹ data was carried out. During this time period there was a significant increase in prosthesis use and a significant decrease in the number of operations performed for early (< 2 years) recurrence. The same inventory was made for the years 1999 and 2001. We studied whether there was an increase in the use of prosthesis and whether there were changes in the percentage of operations for recurrence. The aim of this study has been to analyse whether changes in technique influenced the operation rate for recurrence.

Patients and methods

A retrospective study was performed which included all male adults (>18 years) undergoing IH surgery in the Amsterdam region which is inhabited by more than a million people. Data from all hospitals (university, large training hospitals and district hospitals) were included. All hernia operations in 1994, 1996, 1999 and the first quarter of 2001 were analyzed. In 2001 only data from the first three months was collected because this was part of an inventory study, which was performed in the Netherlands as part of the introduction of guidelines for groin hernia surgery. The parameters analyzed included patient demographics, hernia characteristics and surgical technique used. Patients were contacted to supply missing data as necessary. A recurrent hernia was defined as any inguinal or femoral hernia, in a patient previously operated on for any type of IH. A patient with a bilateral hernia with a recurrence on one side and a primary hernia on the other side was classified as one patient with a recurrent hernia. Primary bilateral hernias were counted as one hernia. The data were analyzed using the chi-square test. A p-value of 0.05 was considered to be significant.

Results

In the Amsterdam region 3649 adult males were operated on for IH in 1994, 1996, 1999 and 2001. The average age was 56.5 years (age range 18 to 98 years). The following IH types were seen: indirect 1970/3649 (54.0%), direct 1343/3649 (36.8%), and combined 336/3649 (9.2%). A bilateral operation was performed in 406/3649 (11.1%). There were 61 emergent operations for painful, irreducible hernias (1.7%); the remainder was performed (semi-)electively. No statistically significant differences in patient and hernia characteristics were observed over the 4 years analyzed. (Table 1)

Table 1

Patient, hernia and surgical characteristics.

	1994 n = 1108	1996 n = 1170	1999 n = 1088	2001 n = 283
Age (Yrs)	57 (18-96)	56 (18-94)	56 (18-98)	58 (19-89)
Type of hernia				
Indirect	53.8%	54.4%	54.2%	52.2%
Direct	40.0%	34.8%	35.7%	36.9%
Combined	6.2%	10.8%	10.1%	10.9%
Bilateral	11.0%	10.6%	11.7%	11.7%
Acute operation	1.7%	1.0%	2.4%	1.4%
Recurrence	19.5%	16.8%	14.0%	14.1%
Local anaesthetic	0.8%	1.9%	0.8%	1.4%
Ambulatory care	20%	24%	40%	51%

The number of operations for recurrent hernia decreased from 19.5% (216/1108) in 1994 to 16.8% (197/1170) in 1996 and 14.0% (152/1088) in 1999. In 2001 40 out of 283 (14.1%) patients had an operation for recurrence. When comparing 1999 and 2001 with 1994 there is a significant decrease ($p=0.005$; OR: 0.67 (95%CI:0.53-0.85)). For 80% of patients this recurrence was their first, for 14% their second and for 6% their third or higher. This distribution was almost identical for each year analyzed. The use of local anaesthetic remained limited to 1.4% of patients in 2001; this was 1.9% in 1996. There was an increase in operations done in ambulatory care from 20% in 1994, to 24% in 1996, to 40% in 1999, to 51% in 2001. There was a statistically significant decrease in the use of non-mesh techniques and increase in the use of prosthetic materials. In 2001 no non-mesh technique was used to repair a recurrent hernia. The hernia repair techniques used in the study years are shown in table 2 for primary hernia and table 3 for recurrent hernia. In the last column, data from the first quarter of 2001 are extrapolated to the entire year.

Table 2

Techniques used for primary hernia repair in the Amsterdam region from 1994 to 2001.

Technique	1994 n (%)	1996 n (%)	1999 n (%)	2001 n (%)	2001 data Extrapolated
Non-mesh	797(89.3)	655(67.3)*	279(29.8)*	25(10.3)*	100
Bassini	558(66.2)	295(30.3)*	80(8.5)*	1(0.4)*	4
Shouldice	177(19.8)	310(31.9)*	151(16.1)*	21(8.6)*	84
Other ^a	62(7.0)	50(5.1)	41(4.4)	3(1.2)*	12
Prosthesis	95(10.7)	318(32.7)*	657(70.2)*	218 (89.7)*	872
Lichtenstein	34(3.8)	223(22.9)*	425(45.4)*	151(62.1)*	604
Laparoscopic	51(5.7)	62(6.3)	82(8.8)*	23(9.5)	92
Other ^b	10(1.1)	33(3.4)	150(16.0)*	44(18.1)	176
Total	892	973	936	243	972

*Significantly decreased or increased compared to the previous data ($p \leq 0.05$).

^aHernial sac resection, Mc Vay; ^b Plug and Patch, Wantz, Stoppa

Table 3

Techniques used for recurrent hernia repair in the Amsterdam region from 1994 to 2001.

Technique	1994	1996	1999	2001	2001 data
	n (%)	n (%)	n (%)	n (%)	Extrapolated
Non-mesh	118(54.6)	60(30.4)*	21(13.8)*	0(0)*	0
Bassini	96(44.4)	39(19.8)*	8(5.3)*	0(0)	0
Shouldice	6(2.8)	9(4.5)	7(4.6)	0(0)	0
Other ^a	16(7.4)	14(7.1)	6(3.9)	0(0)	0
Prosthesis	98(45.4)	137(69.6)*	131(86.2)*	40(100)*	160
Lichtenstein	21(9.7)	70(35.5)*	49(32.2)*	15(37.5)	60
Laparoscopic	47(21.8)	26(13.1)	31(20.4)*	12(30)*	48
Other ^b	30(13.8)	41(20.7)	51(33.6)*	13(32.5)	52
Total	216	197	152	40	160

*Significantly decreased or increased compared to the previous data ($p \leq 0.05$).^A Hernial sac resection, Mc Vay; ^B Plug and Patch, Wantz, Stoppa

When analyzing the previous technique used in recurrent hernia (table 4.) there is a decrease in recurrence after non-mesh techniques mainly due to a decrease in the use of Bassini, but a transitory doubling of the Shouldice percentage. The rising number of recurrence after prosthesis is also significant for Lichtenstein. All nine recurrent hernias after Lichtenstein hernioplasty (1999) were of the direct type.

Table 4

Previous techniques used in recurrent hernia.

Technique	1996	1999	2001	2001 data
	n (%)	n (%)	n (%)	Extrapolated
Non-mesh	178 (90.4)	121 (79.6)*	31 (77.5)	124
Bassini	157 (79.7)	96 (63.2)*	24 (60.0)	96
Shouldice	12 (6.1)	20 (13.2)*	3 (7.5)	12
Other	9 (4.6)	5 (3.3)	4 (10.0)	16
Prosthesis	11 (5.6)	23 (15.1)*	6 (15.0)	24
Lichtenstein	2 (1.0)	9 (5.9)*	4 (10.0)	16
Laparoscopic	4 (2.0)	6 (3.9)	0 (0)	0
Stoppa	4 (2.0)	5 (3.3)	0 (0)	0
Other	1 (0.5)	3 (2.0)	2 (5.0)	8
Unknown	8 (4.1)	8 (5.3)	3 (7.5)	12
Total	197	152	40	160

* Significantly decreased or increased compared to the previous data ($p \leq 0.05$).

The number of early recurrences (<2 years) did not differ in time. Table 5 demonstrates an increasing interval between previous operation and recurrence. In 1994, 47% of patients with a recurrent hernia had their previous operation more than 5 years ago compared with 50% in 1999. In 2001 this percentage increased to 73%.

Table 5

Recurrent hernia, time after previous operation.

	1994 n (%)	1996 n (%)	1999 n (%)	2001 n (%)
<2 years	57 (26.3)	40 (20.3)	38 (25.0)	10 (25.0)
2-5 years	51 (23.6)	50 (25.3)	28 (18.4)	1 (2.5)
5-10 years	36 (16.6)	32 (16.2)	23 (15.1)	5 (12.5)
>10 years	67 (31.0)	68 (34.5)	53 (34.9)	24 (60.0)
Unknown	5 (2.3)	7 (3.6)	10 (6.6)	0 (0.0)
Total	216	197	152	40

In 1999, 740 IH operations were performed in a training hospital, 166 (22.4%) were performed by residents alone. When comparing to 1996 this was a significant decrease 159/521 (30.5%). Accordingly there was a significant increase in operations performed by a resident with attending surgeon supervision as shown in table 6. When comparing 2001 to 1999 a same significant pattern was seen.

Table 6

Skill of operating surgeon in teaching hospital.

	1996 n (%)	1999 n (%)	2001 n (%)
Surgeon	71 (13.6)	95 (12.8)	15 (8.6)
Surgeon + Resident	98 (18.8)	135 (18.2)	39 (22.5)
Resident + Surgeon	193 (37.0)	342 (46.2)*	101 (58.4)*
Resident	159 (30.5)	166 (22.4)*	18 (10.4)*
Unknown	0 (0.0)	2 (0.2)	0 (0.0)
Total	521	740	173

* Significantly decreased or increased compared to the previous data ($p \leq 0.05$).

Discussion

In this study in the Amsterdam region the total number of inguinal hernia repair and the patient characteristics remained nearly constant.

A significant decrease in operations performed for recurrent hernia, from 19.5% in 1994 to 14% in 1999 and 2001 was found. It has to be taken into account that these percentages only reflect operated recurrent hernias, and many patients with asymptomatic recurrences may not have undergone surgery. It has been suggested by other researchers that the actual recurrence rate may be estimated by doubling the number of operations performed for recurrent hernia.⁷

Nevertheless, this decrease could be an indication of the improved quality of hernia repair within the last 5 years because the total number of recurrent hernias is decreasing and the interval between previous operation and recurrence is increasing. This increase in "old" recurrence suggests an even further decrease in the total number of recurrent hernias. The improved recurrence rates in the group 2 to 5 years after previous operation can be explained by the rise in number of Shouldice and Lichtenstein repairs in earlier years, but then it is hard to explain the stable percentage of recurrences within 2 years. One explanation might be the "technical failures" after a Lichtenstein repair, resulting in an early direct recurrence. The number of operations performed in ambulatory surgery is increasing (51%) and is almost as high as reported in other countries in the previous years (54-59%).^{1,3}

Also the use of local anesthetics is surprisingly low (<2%) compared to Scotland 6%⁵, Sweden 7%³ and Denmark 18%.¹ The reluctance of surgeons to operate under local anesthesia is hard to explain since small modifications make it possible to perform an operation without discomfort to patients.¹⁰

We witnessed an increase in the Amsterdam region in the use of the Lichtenstein hernia repair technique over the study years although during that time period there was no evidence that this technique was superior to others. Since then many studies have proven the superiority of this tension free repair¹¹ or other mesh repairs over non-mesh repairs.^{12,13,14,15} This study confirms the increasing popularity of the Lichtenstein hernia repair technique. Other techniques, using prosthesis, are increasing in frequency as well. The Bassini technique is waning, as in the Shouldice repair. These changes have also been seen in other countries.^{1,4}

Prosthetic use for recurrent hernia has increased even more from 86% in 1999 towards 100% in 2001. This mirrors the findings of a Swedish study by Haapaniemi, et al where 82% of recurrent hernias were repaired with mesh technique.³ This study also found that use of mesh in recurrent hernia provides a relative risk reduction for recurrence. The NHS in Scotland corrects recurrent hernia in 91% of patients with some type of mesh repair.⁵

The past 5 years there has also been an increase in attention for hernia surgery as demonstrated in the significant rise in supervision of surgical residents by surgeons during operations. This will without a doubt improve the outcome of

hernia surgery. This may be supported by research done in Scotland where 95% of operations was done in the presence of a surgeon with a lower percentage of operations performed for recurrence (8%).⁵ It is however difficult to analyse the factor that most influences results whether it is the technique or the expertise and level of experience of the surgeon. One could hypothesize that a Shouldice by an expert is just as good as a Lichtenstein by a non expert. "Choose the surgeon and not the technique" is a well known proverb.

In 2003, new guidelines for groin hernia surgery were introduced in The Netherlands. One of the hospitals involved in this study had adopted and used these guidelines in 1998. It is very promising to see that at this hospital all 7 operated recurrences (2001) had their previous operation elsewhere.

In contradistinction, 1 out of 3 recurrences in the other hospitals was one of their own. This study of 3649 patients has some limitations of course. It is retrospective and the number of recurrences is measured indirectly tending to underestimate actual IH recurrence rates. Furthermore the previous technique used in recurrent hernia has to be correlated with the total number of this technique performed in previous years. This means that the demonstrated reduction in recurrences after Bassini and the increase of recurrence after prosthetic repair cannot easily be interpreted.

The results also show that no technique is perfect, as demonstrated by an increase in recurrence after the use of prosthesis as a preceding technique (15%). In most of these cases the Lichtenstein hernia repair was used. Since all recurrences after this method were of the direct type this may be explained as technical failures or due to the learning curve of the surgeons^{16,17}. This is supported by Bay-Nielsen who stated "the most plausible explanation of the direct recurrences is an insufficient medial mesh fixation and overlap over the pubic tubercle. By increased attention to this aspect more than half of the recurrences after Lichtenstein repair could possibly be avoided."¹⁸

Conclusion

In the period from 1994 to 2001 we have seen a significant increase in the use of prosthesis for IH repair in adult males in the Amsterdam region. Surgical residents are receiving more attending surgeon supervision in the operating theatre. These two factors may explain the decrease in operations performed for recurrent IH from 19.5% to 14.1%.

Acknowledgements

The authors thank the surgeons in participating hospitals for sharing their data. Participating centers (alphabetical order): Prof. Dr. H. Obertop, Academic Medical Center Amsterdam, Dr. D. van Geldere, Amstelveen Hospital Amstelveen, P.J. Tolenaar, Boven-IJ Hospital Amsterdam, Dr. D. de Jong, Free University Hospital Amsterdam, Dr. N.J.M. Out, Onze Lieve Vrouwe Gasthuis Amsterdam, Dr. B.J. Dwars, Slotervaart Hospital Amsterdam, Dr. W.F. van Tets, St Lucas-Andreas Hospital Amsterdam.

References

- 1** Bay-Nielsen M, Kehlet H, Strand L, Malmstrom J, Heidemann Andersen F, Wara P, Juul P, Callesen T. Quality assessment of 26304 herniorrhaphies in Denmark: a prospective nationwide study. *Lancet* 2001; 358:1124-1128.
- 2** Sandblom G, Gruber G, Kald A, Nilsson E. Audit and recurrence rates after hernia surgery. *Eur J Surg* 2000; 166:154-158.
- 3** Haapaniemi S, Gunnarsson U, Nordin P, Nilsson E. Reoperation after recurrent groin hernia repair. *Ann Surg* 2001; 234:122-126.
- 4** Nilsson E, Haapaniemi S, Gruber G, Sandblom G. Methods of repair and risk for reoperation in Swedish hernia surgery from 1992 to 1996. *Br J Surg* 1998; 85:1686-1691.
- 5** Hair A, Duffy K, McLean J, Taylor S, Smith H, Walker A, MacIntyre IM, O'Dwyer PJ. Groin hernia repair in Scotland. *Br J Surg* 2000; 87:1722-1726.
- 6** Vos PM, Simons MP, Luise JS, van Geldere D, Koelemay MJ, Obertop H. Follow-up after inguinal hernia repair. Questionnaire compared with physical examination: a prospective study in 299 patients. *Eur J Surg* 1998; 164:533-6.
- 7** Haapaniemi S, Nilsson E. Recurrence and pain three years after groin hernia repair. Validation of postal questionnaire and selective physical examination as a method of follow-up. *Eur J Surg* 2002; 168:22-28.
- 8** Simons MP, Vos PM, van Geldere D, Hoitsma HF, Obertop H. More recurrences than expected following inguinal hernia surgery. *Ned Tijdschr Geneeskd* (article in dutch) 1996; 140:2506-9.
- 9** Schoots IG, van Dijkman B, Butzelaar RM, van Geleere D, Simons MP. Inguinal hernia repair in the Amsterdam region, 1994-1996. *Hernia* 2001; 5:37-40.
- 10** Amid PK, Snulman AG, Lichtenstein IL. Local anesthesia for inguinal hernia repair: step-by-step procedure. *Ann of Surg* 1994; 220:735-737.
- 11** Nordin P, Bartelmess P, Jansson C, Svensson C, Edlund G. Randomized trial of Lichtenstein versus Shouldice hernia repair in general surgical practice. *Br J Surg* 2002; 89:45-49.
- 12** EU Hernia Trialists Collaboration. Mesh compared with non-mesh methods of open groin hernia repair: systematic review of randomized controlled trials. *Br J Surg* 2000; 87:854-859.
- 13** EU Hernia Trialists Collaboration. Open mesh versus non-mesh repair of groin hernia: meta-analysis of randomized trials based on individual patient data. *Hernia* 2002; 6:130-136.
- 14** EU Hernia Trialists Collaboration. Repair of groin hernia with synthetic mesh. Meta-analysis of randomized controlled trials. *Ann Surg* 2002; 235:322-332.
- 15** EU Hernia Trialists Collaboration. Laparoscopic versus open groin hernia repair: meta-analysis of randomized trials based on individual patient data. *Hernia* 2002; 6:2-10.
- 16** Amid PK. The Lichtenstein repair in 2002: an overview of causes of recurrence after Lichtenstein tension-free hernioplasty. *Hernia* 2003; 7:13-16.
- 17** Amid PK. Lichtenstein tension-free hernioplasty: its inception, evolution and principles. *Hernia* 2004; 8:1-7.
- 18** Bay-Nielsen M, Nordin P, Nilsson E, Kehlet H. Operative findings in recurrent hernia after a Lichtenstein procedure. *The American Journal of Surgery* 2001; 182:134-136.

Observo, ergo est