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Evaluation of inguinal hernia in ambulatory surgery: A prospective monocentric study on 1009 inguinal hernia

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Abstract

Ambulatory surgery for inguinal hernia has not been really developed in our country.

Aim: We evaluated the feasibility of inguinal hernia surgery on ambulatory.

Patients and methods: From January 1995 to June 2004, we performed 1009 inguinal hernia. There were 934 men (92.8%) and 75 women (7.2%). Middle age was 58.36 years (range: 7–95 years). All the patients were examined by their primary doctor on the first and the third day and by the surgeon on the tenth day after discharge. Telephone follow-up on the patient's condition was performed by a registered nurse on postoperative days 1 and 3.

Results: Eight hundred and thirty three patients were operated on by ambulatory surgery (82.5%). Overall morbidity was 8.5% ($n=86$). Satisfaction index was excellent for 93.8% ($n=948$). Locoregional anesthesia alone or associated with general anesthesia was used for 900 patients (98.1%). Only 466 patients (46.2%) were painful, 258 (25.55%) had a discomfort, and 285 (28.24%) had no symptomatology.

Conclusion: Tension-free technique under locoregional anesthesia for inguinal hernia allows ambulatory surgery with a low rate of morbidity and high satisfaction index.

Keywords: Inguinal hernia; Ambulatory surgery; Locoregional anesthesia

Ambulatory surgery, or day surgery, is defined as the whole of the surgical acts carried out under technical conditions requiring imperatively the safety of an operating theatre suite under an anesthesia of variable modalities allowing, without raised risk, the exit of the patient the same day of its admission. In our country this surgery has not been really developed. In 1998, there were 130,000 operations for inguinal hernia. Only 6% were conducted in ambulatory (adults and children) and only 1.6% concerned adult surgery [1]. We put in place a structure which allowed us the practice of inguinal hernia repair in ambulatory surgery. Mortality and morbidity are not any more the only criteria to evaluate the feasibility of this kind of surgery. Quality of life and security seem to be important. In this study, we evaluated the feasibility in our institution of inguinal hernia surgery in ambulatory. In addition to the study of early morbidity, pain and index of satisfaction were analyzed. These criteria are necessary to evaluate a technique in ambulatory surgery.

1. Patients and methods

This is a monocentric prospective study conducted from January 1995 to June 2004. On this period, 1009 patients were operated for inguinal hernia. Ambulatory surgery was

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Table 1
Medicolegal criteria for ambulatory surgery

Psychological criteria	Medical criteria
Having a home	Age > 6 months
Having a phone number	ASA < grade 3
Not be alone at home	
No psychologic trouble	
Good understanding	

ASA: American Society of Anaesthesiology.

proposed for all the patients after exclusion of some not corresponding to the legal criteria of ambulatory (Table 1). Decision of ambulatory surgery was not influenced by the medical history, the age, or the body mass index. All the patients were visited by the surgeon and the anesthesiologist before their exit, by their doctor on days 1 and 3, and by the surgeon on day 10.

1.1. Population

There were 934 men (92.8%) and 75 women (7.2%). Middle age was 58.36 years (range: 7–95 years). Majority of patients were between 40 and 80 years of age. American Society of Anaesthesiology (ASA) grade I or II risk for general anesthetic was 43% ($n = 434$) and 42.8% ($n = 432$), respectively. 51.3% ($n = 509$) of the patients were retired at the time of surgery. Patients who were operated in ambulatory surgery corresponded to the legal criteria (Table 1).

1.2. Surgical procedure

Patients underwent open mesh hernioplasty (tension-free). None surgery was realised under laparoscopy. We used a polypropilen mesh MS 90 (12/65), 90 g/cm^2 from Textile Hi-Tec® for Swing-technologies®.

1.3. Postoperative management

After separate assessments by the operating surgeon and the anesthetist, patients were discharged on the same day with a letter for their doctor. All patients were prescribed an oral compound analgesic (paracetamol and codein), and a 24-h telephone hotline was available to patients in case of any problems or queries. All patients had follow-up at the tenth day after discharge. Telephone follow-up on the patient's condition was performed by a registered nurse on postoperative days 1 and 3.

1.4. Anesthetic technique

Ilio inguinal block and monitored anesthesia care was mostly used. This technique consisted in three punctures combined with an infiltration of surgical incision. The block was performed with short bevel needle (45°, 50 mm, 24 G) and 40 ml of local anesthetic was used (Ropivacaine 0.75 or Bupivacaine 0.50). A light sedation was given before punctures (Midazolam). In case of anesthesia was not sufficient Lidocaine 1% was given locally by the surgeon and/or intravenous sedation was given by the anesthetist.

2. Statistical analysis

Simple descriptive analysis was performed to describe the population. Statistical difference was determined by Chi-square test for qualitative variant. For the comparison between qualitative and quantitative variant, variance analysis or Kruskall test was performed where appropriated. A p-value of less than 0.05 was regarded as significant.

3. Results

3.1. Descriptive analysis

On 1009 patients, 82.5% ($n = 833$) were operated on ambulatory. Hernia was not complicated for the majority (97.1%; $n = 980$). Surgical procedure was principally an open mesh hernioplasty (tension-free technique): 84.9% ($n = 857$). 98.1% ($n = 900$) of them were operated with locoregional anesthesia alone or associated with general anesthesia (details of the population are given in Table 2). None of the patients presented a preoperative complication. Operative time was 31.6 min (10–135 min). Theatre suite duration was 64.6 min (40–435 min). The remaining patients were not operated in ambulatory surgery ($n = 176$; 17.5%). The principal cause was the respect of the medicolegal criteria of ambulatory surgery. Overall morbidity was 8.5% ($n = 86$): hematoma (3.2%), ecchymosis (5.3%), and urinary infection (0.1%). None mesh infection has been diagnosed. The postoperative pain evaluation was made according to the Analogic Visual Evaluation (EVA): 466 patients (46.2%) presented a real pain ($3 < \text{EVA} < 10$) and 374 (37.1%) had only a simple discomfort ($\text{EVA} < 3$). Majority of the patients walked the day of their surgery (94.8%; $n = 957$). Overall satisfaction was excellent for 93.8% of the patients ($n = 948$).

3.2. Risk factors for hospitalisation

Details of the results are summarized in Table 3. The preoperative symptomatology of the hernia was a determinant factor for an hospitalisation. Patients who presented

Table 2
Type of anesthesia used for the inguinal hernia repair

Type of anesthesia	Number of patients
Locoregional anesthesia alone	696 (69%)
Locoregional anesthesia + intravenous sedation	173 (17.1%)
Locoregional anesthesia + general anesthesia	121 (12%)
General anesthesia alone	19 (1.9%)

Table 3
Risk factors for hospitalisation versu ambulatory surgery for inguinal hernia

	Ambulatory	Hospitalisation	p
Age (years)	56.8	65.6	$<10^{-6}$
ASA	1.6	1.9	$<10^{-6}$
BMI	24.44	24.4	NS
Surgery duration (min)	30.9	35.15	0.001
Total duration (min)	63.61	69.8	NS
Preoperative pain	6%	13.6%	0.01
Bilateral hernia	4.9%	13.3%	0.0002
General and local anesthesia	12.3%	21.7%	0.01

ASA, American Society of Anaesthesiology grade; BMI, body mass index; NS, no statistical difference.

a pain before surgery was usually hospitalised conversely to the patients with no symptomatology: 13.6% versus 6%, respectively ($p = 0.01$). The presence of a bilateral hernia brought about a frequent hospitalisation: 13.3% versus 4.9% ($p = 0.00008$). In the same way, general associated with local anesthesia is a risk factor of hospitalisation: 21.7% versus 12.3% ($p = 0.01$).

3.3. Risk factors of postoperative morbidity

Overall morbidity (surgical and medical) represented 8.5% ($n = 86$). Age of the patients was a determinant factor. Older patients had more morbidity than younger: 63 years old versus 57.9 years old ($p = 0.005$). Patients who presented a dysury (11.8%) before surgery had more complications than the patients without dysury (6.8%) ($p = 0.007$). The symptomatology of the hernia (pain during a walk or a rest) was statistically significative for the morbidity in comparison with none symptomatology ($p = 0.0014$). In contrast, type of hernioplasty, anesthesy, ASA score were not find as risk factors.

Table 4
Risk factors of postoperative pain

Risk factors	Postoperative pain	p
Ambulatory/hospitalisation	46.7%/44%	NS
Age (years)	60.6/55.75	0.000001
Tabagism (Y/N)	43.9%/59.1%	0.004
Constipation (Y/N)	45.3%/61.8%	0.007
Pain during walking (Y/N)	43.8%/56.2%	0.0009
Pain during rest (Y/N)	41.9%/58.1%	0.0009
Surgical techniques (Shouldice/Lichtenstein)	66.7%/48.4%	0.005
Duration (surgery/anesthesia)	64%/68%	0.001

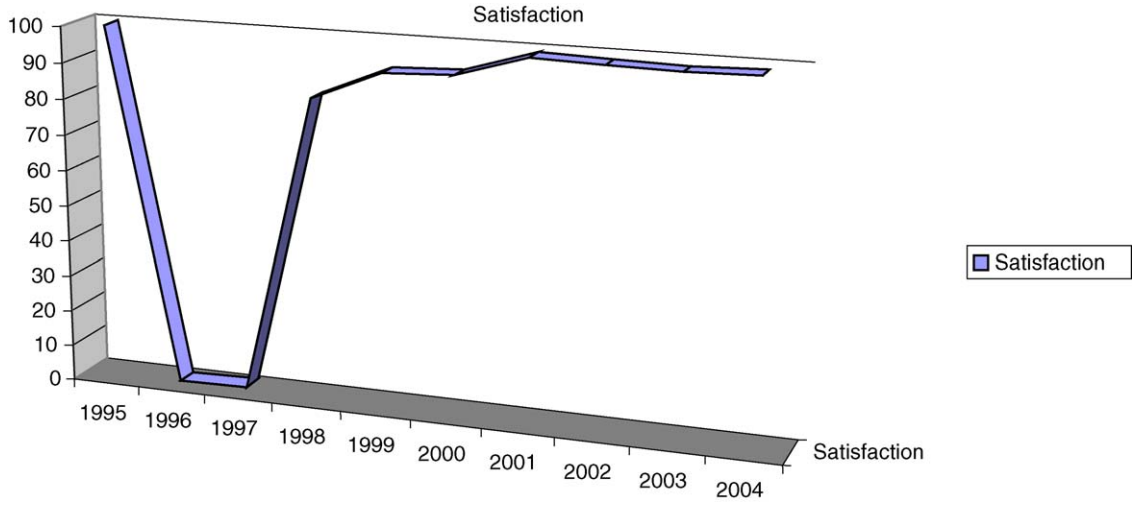
Results are expressed in percentage of patients presenting pain in each category. Y (yes), presence; N (no), absence.

3.4. Postoperative pain

Pain is a criteria difficult to evaluate. We determined two level of pain depending of the EVA. Four hundred and sixty six patients (46.2%) were painful ($3 < \text{EVA} < 10$), 258 (25.55%) had a discomfort, and 285 (28.24%) had no symptomatology. In the majority of cases, pain was soothed as 80% of all the patients signaled no symptomatology after oral analgesic. Results of the risk factors for postoperative pain are summarize in Table 4. Two characteristics statistically significative have been founded. This is the constipation and tabagism ($p = 0.0009$).

3.5. Satisfaction index

This is a patient's subjective evaluation of their taking charge during the hospitalisation in the ambulatory structure when they visit the surgeon on day 10. Since 1980, satisfaction index is around 80% and more than 98% from 2000 to 2004 (Graph 1). The most important parameter encountered for a non-satisfaction was the insecurity of the first night.



Graph 1. Satisfaction index evaluation during the years 1995–2004.

4. Discussion

Ambulatory surgery, or day surgery, permit to the patient to go home the same day of its surgery. It justifies a better quality of care for a lesser cost [2]. In this study we proved that the "tension-free" is a good technique for this surgery under local anesthesia. We present a study with 82.5% of the patients who are operated in ambulatory with a satisfaction index superior to 98% the last 4 years. In our country, ambulatory surgery for inguinal hernia is not still enough developed compare to European countries (6% versus 11%, respectively) [3]. In contrast, De Lathouwer et al. showed that the United State and the Canada practice usually this surgery (84% and 43%, respectively) [4]. Difficulties encounter were essentially the absence of discussion with the patient and the structure necessary to practice ambulatory surgery [5]. In France, on 130,000 inguinal hernia, only 1.6% are operated in ambulatory (except the children) [1]. In this study, we do not excluded patients. The difference in this study, compare to others, is the absence of selection of the patients even if it was a big hernia, a recurrence, a body mass index to high, or bilateral hernia [6–10]. We proposed ambulatory surgery depending of the medicolegal criteria describe by Hollender et al. [11]. The overall rate of satisfaction is 93.9% with more than 98% the last 4 years. It is no more the risk of pain which contribute to the absence of satisfaction but the apprehension about the first night outside the hospital [12]. We found in this study a parameter classically describe for hospitalisation such as bilateral hernia (13.5% versus 4.9%; $p = 0.0002$). In contrast, we do not found statistical difference for obesity which is a criteria commonly exclude of the studies [6,9]. Pain of the hernia before surgery seems to play an important role for the risk of hospitalisation. Indeed, 13.6% versus 6% of our patients who presented pain at rest and with walk were hospitalised more than 24 h ($p = 0.01$). The surgical procedure used in this study was mainly the "tension-free" technique (84.9%; $n = 857$ patients) as it was first described by Lichtenstein [13] and Shulman et al. [14]. It is a procedure reproducible, easy to learn, and realised under locoregional anesthesia [15]. This technique, described by Lichtenstein, must be the gold standard for inguinal hernia in ambulatory surgery [16]. The meta-analysis of the European Union Hernia Trialist Collaboration showed better results for the laparoscopic versus the open procedure (pain and return to work). However, this technique is longer, costly, general anesthesia is necessary, and the learning curve is longer and difficult [17].

Majority of our patients were operated under locoregional anesthesia (86.1%; $n = 869$). This procedure was used isolated (696 patients or 69%), or associated to a intravenous sedation (173 patients or 17.1%). The number of patients operated under this procedure shows that it is a good technic for ambulatory surgery. Indeed, it permits anesthesia but also extended reduction of postoperative pain [18,19]. Song et al. published a randomised study on the type of anesthesia for inguinal hernia [20]. They founded that locoregional anesthesia was better than general or peridural anesthesia for postoperative pain, return to work, and cost ($p < 0.05$). These results are similar to ours even if we did not compare the different type of anesthesia (satisfaction rate at 93.8% in our study). This procedure permits a real reduction of adverse effects of anesthesia such as vomiting, orthostatic hypotension, to meet the deadline of discharge [21–23]. The major side effect for locoregional anesthesia is the risk of crural paresis as we founded in this study. Thirteen patients presented this complication and seven could not be discharged the same day of the surgery. It represented 1.5% of the patients operated with locoregional anesthesia. It is a side effect well known by the injection of Ropivacaïne too deep in the muscle [24,25] for 20–30% of the patients [26]. When we studied the postoperative morbidity, we do not found urinary retention as it is described for inguinal hernia surgery under general anesthesia [27] or under laparoscopy [28]. Among the complications, we found two parameters which seem to occur in their apparition and they are not describe in the literature. This is the presence of dysury or not (16.8% versus 7.6%; $p = 0.0006$), and preoperative painful hernia or not (6.4% versus 16.4%; $p = 0.014$). The postoperative pain is a criteria difficult to estimate even if the patient visit his medical doctor on days 1 and 2 and the surgeon on day 10. The first symptomatology, when they return to their home, seems to be reduced the tenth day for the visit. In this study, 466 patients (46.2%) were painful ($3 < \text{EVA} < 10$), 258 (25.55%) had a discomfort, and 285 (28.24%) had no symptomatology. In the majority of cases, pain was soothed as 80% of all the patients signaled no symptomatology after oral analgesic. It looks like that locoregional anesthesia associated with the use of oral analgesic, before apparition of pain, permit a reduction of postoperative pain [29]. In the same way, for a better control of pain, it is necessary to identify patients with a chronic tabagism and constipation. We founded a higher risk of postoperative pain for such patients and it will be necessary to increase oral analgesic for them. The overall satisfaction was 93.8% with more than 98% for the last 4 years. It is reported that pain is the essential factor of non-satisfaction [30]. In this study, it seems that this parameter is not predominant. Insecurity during the first night was the first criteria. To avoid this feeling, we tried to move the hospital to the home of the patient. We give all the information necessary before surgery, and the patient make a visit of the ambulatory structure. He is seen by the surgeon and the anesthetist before his discharge with a letter, the report of surgery, a data record hospital-city, oral compound analgesic, and a 24-h telephone hotline is available to patients in case of any problems or queries. The application of a legal protocol for ambulatory surgery allowed us to develop this surgery. In 1995, 60% of the hospitalised patients were due to the surgeon or the patient himself and only 20% by the respect of the protocol. The latest years, 66.6–80% of the hospitalised patients were due to the application of the protocol. The remaining patient was hospitalised for disfunction (morbidity, administrative complications). Our attitude concerning ambulatory surgery

changed during the years to allowed us the practice of this kind of surgery in an adapted structure.

The tension-free technique for inguinal hernia in ambulatory surgery is workable (82.5% of our patients). Using a locoregional anesthesia for ambulatory seems to be better (98.1% of the patients) with a satisfaction rate of 93.8%. We need to take care about quality of life and security after ambulatory surgery. This study showed a high level of satisfaction with a low morbidity rate for inguinal hernia. This is the result of a good postoperative analgesia and the use of an adapted structure for ambulatory surgery.

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References

[1] Sales JP. Contribution of ambulatory digestive surgery. J Chir 2000;137:268–73.
[2] Berk AA, Chalmers TC. Cost and efficacy of the substitution of ambulatory for inpatient care. N Engl J Med 1981;304:396–7.
[3] L'Huillier MC, Heve D, Sales JP. State of art in ambulatory surgery in France. International and regional comparisons. Communication Orale. Third International Congress on Ambulatory Surgery. Venice April 25th–28th 1999.
[4] De Lathouwer C, Poullier JP. Ambulatory surgery in 1994–1995: the states of the art in 29 OECD countries. Ambul Surg 1998;6:43–55.
[5] L'Huillier MC, Mann C, Migliori G. Ambulatory surgery in French public hospitals. Present and future. Public hospitals group of the French Association of Ambulatory Surgery. Presse Med 1998;27:347–50.
[6] Champault G, Benoit J, Lauroy J, Rizk N, Boutelier P. Inguinal hernias in adults. Laparoscopic surgery versus the Shouldice method. Controlled randomized study: 181 patients. Preliminary results. Ann Chir 1994;48:1003–8.
[7] Damamme A, Samama G, D'Alche Gautier MJ, Chavanel N, Brefort JL, Leroux X. Medico-economic evaluation of treatment of inguinal hernia: Shouldice vs. laparoscopy. Ann Chir 1998;52:11–6.
[8] Hauters PH, Meunier D, Urgyan S, Jouret JC, Janssen P, Nys JM. Prospective controlled study comparing laparoscopy and the Shouldice technique in the treatment of unilateral inguinal hernia. Ann Chir 1996;50:776–81.
[9] Lecalve JL, Trebuchet G. Treatment of inguinal hernias by transperitoneal celioscopic approach. Ann Chir 1996;50:795–8.
[10] Felix P, Ventadoux Y, Guerineau JM. Outpatient management, patient comfort and satisfaction of 100 consecutive inguinal hernias treated by Shouldice procedures with steel wire under local anesthesia. Ann Chir 1999;53:387–96.
[11] Hollender LF, Meyer C, Manzini N. Criteria for selection and contra-indications of ambulatory surgery. Chirurgie 1990;116:568–72.
[12] Felix P, Guerineau JM, Vincent C, Brossard G, Granieri F. Shouldice steel wire repair and under local anesthesia: prospective evaluation of postoperative comfort. Ann Chir 1998;52:321–5.
[13] Lichtenstein IL. Herniorraphy: a personal experience with 6,321 cases. Arch Surg 1987;153:553–9.
[14] Shulman AG, Amid PK, Lichtenstein IL. The safety of mesh repair for primary inguinal hernias. Ann Surg 1992;58:255–7.
[15] Rose K, Wright D, Ward T, McCollum C. Tension free-mesh hernia repair: recovery and reoccurrence after one year. Ann R Coll Surg Engl 1999;81:329–32.
[16] Kingsnorth AN, Porter CS, Benett DH, Walker AJ, Hyland ME, Sodergren S. Lichtenstein patch or Perfix plug-and-patch in inguinal hernia: a prospective double-bind randomized controlled trial of short-term outcome. Surgery 2000;127:276–83.
[17] EU Trialists Collaboration. Mesh compared with non mesh methods of open groin hernia repair: systematic review of randomized controlled trials. Br J Surg 2000;87:854–9.
[18] Harrisson CA, Morris S, Harvey JS. Effect of ilioinguinal and iliohypogastric nerve block and wound infiltration with 0.5% bupivacaïne on postoperative pain after hernia repair. Br J Anaesth 1994;72:691–3.
[19] Ding Y, White PF. Post herniorrhaphy pain in outpatients after preincision ilioinguinal–hypogastric nerve block during monitored anaesthesia care. Can J Anaesth 1995;42:12–5.
[20] Song D, Greilich NB, White PF, Watcha MF, Tongier WK. Recovery profiles and cost of anesthesia for outpatient unilateral inguinal herniorraphy. Anesth Analg 2000;91:876–81.
[21] Dierking GW, Ostergaard E, Ostergaard HT, Dahl JB. The effect of wound infiltration with bupivacaïne versus saline on postoperative pain and opioid requirements after herniorrhaphy. Acta Anaesthesiol Scan 1994;38:289–92.
[22] Nehra D, Gemmell L, Pye JK. Pain relief after inguinal hernia repair: a randomized double blind study. Br J Surg 1995;82:1245–7.
[23] Callesen T, Kehlet H. Postherniorraphy pain. Anesthesiology 1997;87:1219–30.
[24] Price R. Transient femoral nerve palsy complicating ilioinguinal nerve blockade for inguinal herniorrhaphy. Br J Surg 1995;82:137–8.
[25] Rosario DJ, Skinner PP, Raftery AT. Transient femoral nerve palsy complicating preoperative ilioinguinal nerve blockade for inguinal herniorraphy. Br J Surg 1994;891:897.
[26] Rosario DJ, Jacob S, Luntley J. Mechanism of femoral nerve palsy complicating percutaneous ilioinguinal field block. Br J Anaesth 1997;78:314–6.
[27] Condon RE, Nyhus LM. Complication of groin hernia. Hernia 1995:276.
[28] Kark AE, Kurzer MN, Belsham PA. Three thousand one hundred seventy-five primary inguinal hernia repairs: advantages of ambulatory open mesh repair using local anesthesia. J Am Coll Surg 1998;186:447–56.
[29] Porrero Caro JL, Sanchez Cabezudo C, Diaz Guerra E, Lee Wong P. Postoperative analgesia in herniorraphy with local anaesthesia, and monitored anaesthesia care. Hernia 1998;2:103–6.
[30] Baskerville PA, Jarret PEM. Day case inguinal hernia repair under local anaesthetic. Ann R Coll Surg Engl 1983;65:224–5.