

Early complications in tension-free hernioplasty: comparison between ambulatory and short-stay surgery

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Summary: This is a prospective cohort study of the early results in tension-free hernioplasty in both ambulatory surgery (AS) and short-stay surgery (SS).

We recorded data of 609 patients with 707 hernias. 346 patients (57%) were operated on by AS and 253 (43%) as SS. Tension-free hernioplasty was performed in 95% of cases. Regional anesthesia was the most common anesthetic procedure in both groups. Patients of the AS group were younger (AS = 49 years, SS = 62 years) and had fewer associated diseases. The commonest immediate complication was urinary retention in both groups (AS = 9.5%, SS = 10.5%). Hematoma was the most common early complication but there were no differences between groups (AS = 5.2%, SS = 7%). Wound infection rate was 2.3 % (AS = 1.4%, SS = 3.2%), but removal of the mesh was not needed in any case. Other complications were seroma (AS = 2.8, SS = 2.9%), pain (AS = 2.2%, SS = 1.2%), and orchitis (0.3% in both groups). There were low early complication rates in both groups, with better results (not significant) in the AS group. The advantages of ambulatory surgery make this the method of choice in suitable patients.

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Ambulatory surgery has developed widely in recent years and many surgical procedures may be performed on an ambulatory basis. This allows great saving in hospitalization charges and has many advantages for the patients. Their own homes are more comfortable than a hospital bed and they regard their operation as less important.

Inguinal hernia repair is the most common procedure in general surgery in Spain: in 1993, 26,339 inguinal hernias were operated on an elective basis [Revuelta 1997]. Ambulatory surgery is cheaper than short-stay surgery, and if most hernia patients can be managed in this way, hospitalization charges are eliminated. Moreover, some studies have

shown better results in wound infection rates in ambulatory surgery than in short-stay surgery [Porrero 1999].

Tension-free hernioplasty is the procedure of choice in hernia surgery in our center. This technique is simple, easy to perform, and has excellent short- and long-term results. Moreover, the Lichtenstein procedure causes minimal or

no pain in the postoperative period, Which is one of the criteria for ambulatory surgery. The aim of this study was to assess any differences in early morbidity in tension-free hernioplasty between both types of admission.

Material and methods

This was a prospective cohort study, including all patients with inguinal hernias operated on an elective basis in either of the two modalities: ambulatory surgery (AS) and short-stay surgery (SS). The following data were recorded: age, sex, associated diseases, ASA status, type of admission, date of procedure, kind of hernia, type of anesthetic technique, immediate complications, length of postoperative stay and early postoperative complications. In the AS group, unexpected admissions and their causes were recorded.

The type of admission depended on the selection criteria for ambulatory surgery in our center (Table 1). Patients satisfying these criteria were admitted for ambulatory surgery and those did not for short-stay surgery. The preoperative study depended on sex, age and ASA status of the patients (Table 2). Hernias were classified by a modified Gilbert's classification [Gilbert 1993]. Anesthetic procedure depended on the anesthesiologist's preferences. Antibiotic prophylaxis was administered in all cases with cefazolin 2 g iv (or erythromycin 1 g iv in patients with allergy to penicillins and derivatives) before surgery. In most type 1 hernias, primary repair was performed. The Lichtenstein procedure [Lichtenstein 1989] was performed in inguinal hernias types 2, 3, 4, 5, 6 and a few type 1. In femoral hernias a mesh-plug repair was performed. When there was an inguinal and femoral hernia in the same case, a Lichtenstein procedure and femoral plug repair were performed. Postoperative follow-up was done at one week and one month after surgery. Hematoma of the surgical wound extended from bruising to large hematomas. Seroma was defined as clear exudate with negative culture. Surgical wound infection was defined as the presence of a purulent discharge from

Table 1. Selection criteria for ambulatory surgery

1. Medical criteria
• Children older than 1 year
• ASA I-II, some stable ASA III
• No morbid obesity
• No respiratory problems
• No history of malignant hyperthermia
2. Surgical criteria
• Surgery with no transfusion
• Hemorrhage less than 200 ml
• Duration of surgery less than 90 minutes
• Surgery with moderate postoperative pain
• No thoracic or intracranial surgery
3. Social criteria
• Patient's acceptance
• House with adequate hygienic conditions
• Ability to understand the instructions
• Responsible adult companion on the day of the surgery and the first postoperative day
• Personal transport
• Telephone in their home
• Home less than 45 minutes from hospital
• House with lift (except in houses at the first floor dwellings or detached or semi-detached houses)

Table 2. Preoperative studies

1. ASA I, younger than 40 years
• Men: nil
• Women: hemoglobin, hematocrit
2. ASA I, 40-59 years:
• Men: creatinine, glucose, ECG (if no previous ECG)
• Women: hemoglobin, hematocrit, creatinine, glucose, ECG (if no previous ECG)
3. ASA I, 60 years or older:
• Men and women:
• haemoglobin, haematocrit, creatinine, glucose, ECG, thorax X-Ray
4. ASA II: haemoglobin, haematocrit, creatinine, glucose, coagulation study, ECG and chest X-ray

the operation site or seroma with positive culture.

All data were registered in a database on MS-Access and statistical analysis was performed with SPSS 7.0 for Windows. All variables, except age and postoperative stay were converted to categorical variables. Quantitative variables were expressed with mean, 95% confidence interval and median, and their differences were evaluated by the Student t-test. Categorical variables were analyzed by using the chi2 test. P values of less than 0.05 were considered statistically significant.

Results

From March 1998 to December 1999, we operated on 609 patients with 707 inguinal hernias. Ninety-eight patients had bilateral hernias (16.1%), 79 in the SS

group and 19 in the AS group ($\chi^2 = 66.679$, $df = 1$, $p < 0.001$). Ambulatory surgery was performed in 346 cases (56.8%) and short-stay surgery in 263 (43.2%). 88.8% of patients were men. Mean age was 55 years (95%CI: 52 to 58 years; median 57). Patients in the AS group were significantly younger than the SS group (49 vs 62 years; $t = 10.725$, $p < 0.001$). The differences in the incidence of associated diseases are shown in Table 3. In the SS group there was a higher frequency of all associated diseases. ASA classification of the patients also differed in both groups (Table 4). In the AS group there was more ASA I patients and a few ASA III. In the SS group there was more ASA II patients, a significant number of ASA III, and a few ASA IV. These differences were statistically significant ($\chi^2 = 148.842$, $df = 3$, $p < 0.001$). Regional

Table 3. Frequencies of associated diseases

Disease	AS (n° and %)	SS (n° and %)	χ^2	P values
Hypertension	35 (10.1%)	66 (25.1%)	24.236	P < 0.001
Heart disease	8 (2.3%)	68 (25.9%)	75.831	P < 0.001
Respiratory disease	22 (6.4%)	44 (10.8%)	16.634	P < 0.001
Diabetes	18 (5.2%)	28 (10.6%)	6.342	P = 0.012
Prostatic syndrome	11 (3.2%)	42 (16%)	30.766	P < 0.001

Table 4. ASA classification

ASA	Ambulatory Surgery (N°)	Short-Stay (N°)
ASA I	222	56
ASA II	121	142
ASA III	3	58
ASA IV	-	7

Table 5. Type of hernia (modified Gilbert's classification)

Type	%
Type 1	1.3%
Type 2	32.3%
Type 3	15.6%
Type 4	29%
Type 5	1.3%
Type 6	7.3%
Type 7	3.1%
Recurrent	10.1%

Table 6. Early complications

Early Complication	Global rate (%)	Ambulatory Surgery (%)	Short-stay Surgery (%)	P values
Hematoma	6.1	5.2	7.0	P = 0.347
Seroma	2.8	2.7	2.9	P = 0.863
Pain	1.7	2.2	1.2	P = 0.293
Surgical wound infection	2.3	1.4	3.2	P = 0.099
Orchitis	0.3	0.3	0.3	P = 0.963
Scrotal swelling	1.1%	0.5	1.8	P = 0.130

anesthesia was performed in 72.2% of all patients, but there were differences in frequencies between groups. In the AS group, general anesthesia was performed in 31.8% of cases and regional anesthesia in 68.2% and in the SS group the corresponding figures were 22.4% and 77.6% respectively; the difference was significant ($\chi^2 = 6.527$, $df = 1$, $p = 0.011$).

There were no differences in the distribution of types of hernia between groups. Types 2 and 4 were the most common. Femoral hernia was present in 22 cases (3.1%), and recurrent hernia in 72 (10.1%) (Table 5) The Lichtenstein procedure was performed in 95.5% of hernias (all inguinal except type 1). Mean postoperative stay in the SS group was 1.6 days (95% CI = 1.3 to 1.9; median = 1). In the AS group, there were 46 unexpected admissions (13.3%). Thirty

of these (66%) were due to anesthetic causes (urinary retention, vomiting), 11 to social causes (family or patient negative, poor selection for ambulatory surgery), 4 to surgical reasons (difficult surgery, pain) and 1 to unknown reasons.

Immediate complications

Urinary retention was present in 9.9% of patients, without differences between groups (AS:9.5% vs SS:10.1%, $p = 0.802$). Nausea and vomiting occurred in 25% of patients (AS: 3.2%, SS: 1.5%, $p = 0.191$). Bleeding from the surgical wound was infrequent (3 cases, 0.4%).

Early complications (Table 6)

There was a low complication rate in all the population. Hematoma was present in 6.1% of cases, but there were no diffe-

rences between groups. Open drainage of the hematoma was needed in only 3 cases, all of whom were on treatment with oral anticoagulants before surgery. Twenty cases (2.8%) had seroma of the surgical wound, without differences in the groups. Infection of the surgical wound was present in 16 cases (2.3%): 3.2% of the SS group and 1.4% of the AS group. These differences were not significant ($p = 0.09$), but the incidence in the SS group was more than twice that in the AS group. In 13 cases culture of the wound exudate was taken. The most common microorganisms cultured were *Staphylococcus aureus* and *Enterobacteria* (*Escherichia coli* and *Enterococcus faecalis*). All cases were treated with local measures and oral antibiotics, and no mesh removal was needed in any case.

Discussion

In Spain, until recently, all hernia repairs were performed with hospital admission. Due to their characteristics, hernia repair is a technique amenable to ambulatory treatment. Ambulatory surgery is constantly gaining in popularity throughout the world. The low rate of adverse events or complications during the intraoperative or immediate postoperative periods further justifies its rapid growth. The introduction of new procedures such as tension-free hernioplasty has favored this development. Since Lichtenstein's publication in 1989 [Lichtenstein 1989], tension-free hernioplasty has become the gold standard for hernia repair. It is easy, safe and has excellent short- and long-term results [Amid 1993]. In our center the Lichtenstein technique has been the procedure of choice for inguinal hernia repair, except in type 1 hernias, where primary repair was performed. Our global results are similar to those of other series, with a low rate of early complications.

Not all patients or surgical pathologies are suitable for AS. From the beginning, there have been some selection criteria for eligibility [Davis 1987]. These criteria were initially very restrictive but, given the excellent results and low rate of adverse perioperative events, they

have become more flexible. Due to the selection criteria for AS, patients in this group were younger and had fewer associated diseases in our study. Patients in the SS group included those on anticoagulant therapy, or with oxygen therapy at home.

Immediate complications were directly related to the anesthetic technique. In Spain, spinal anesthesia is very popular with anesthesiologists and they are comfortable with this technique. But this type of anesthesia has a high incidence of urinary retention. In our series, spinal anesthesia was the commonest

procedure in both groups and 9.9% of cases had urinary retention, but there were no differences between groups. Eighty-five percent of these patients had regional anesthesia. In the AS group, urinary retention was the cause of unexpected admission in 55%. Postoperative nausea and vomiting had a low incidence, only 2.5%, perhaps due to less use of general anesthesia than in other series [Mezei 1999]

The wound infection rate in AS was lower than in SS, 1.4% vs 3.2%. SS patients had a rate twice as high as AS, but without statistical significance. Per-

haps with more patients in each group it would have reached statistical significance.

Conclusions

In summary, there were low early complications rate in both groups, with better results (not significant) in the AS group. The advantages of ambulatory surgery make this modality of admission the one of choice in suitable patients.

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