

Unanticipated admissions following ambulatory surgery

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Abstract

The principal causes of unanticipated admission to the ambulatory surgery unit at Viladecans Hospital between October 1990 and January 1997 were analyzed. Of 7006 patients who underwent outpatient surgery in our facility, 108 were admitted (1.54%). The mean age was 38 years and 93.5% were American Society of Anesthesiologists' (ASA) physical status classification I and II. The principal reasons for admission were surgical complications 42.5% (46); anaesthetic complications 15.7% (17); uncontrollable pain 13% (14); infections 8.3% (9); protracted vomiting 7.4% (8); and coexisting medical problems 6.4% (7). The percentage of admissions in our facility is comparable to that of other ambulatory surgery units. Haemorrhage and pain were the principal causes of admission, vomiting was not common, and we address the role of infection, which has been overlooked as a reason for admission in other published series, perhaps due to the fact that it occurs after discharge. © 1997 Elsevier Science B.V.

Keywords: Ambulatory surgery; Unanticipated admissions; Perioperative complications

1. Introduction

Unexpected hospital admission following outpatient surgery is a significant measure of the outcome in ambulatory surgical care, reflecting as it does both an unanticipated patient morbidity and a disturbance to the satisfactory practice of ambulatory surgery.

In the ambulatory surgery facility of Viladecans Hospital 7006 patients underwent outpatient surgery. There were 108 unexpected admissions, in 104 patients.

It is necessary to identify the factors associated with a higher incidence of hospital admission, in order to decrease this percentage and to manage a wider range of patients and surgical procedures.

We recorded patients' demographic characteristics, medical history data, American Society of Anesthesiologists' physical status (ASA), type and duration of surgical procedure, type of anaesthetic technique, peri-

operative complications and causes of hospital admissions during the period October 1990–January 1997.

2. Patients and methods

We retrospectively reviewed all patients who underwent ambulatory surgery in Viladecans Hospital from October 1990 to January 1997 ($N = 7006$), using data taken from the surgical activity forms, which is processed and published in the hospital's annual reports. This source revealed the total number of interventions and the percentages of types of surgery and anaesthesia, and these were grouped according to years.

The admissions were identified from the hospital admissions list. Data on all the patients who were admitted either immediately or after discharge ($N = 108$) were individually checked and reviewed using the clinical histories and the forms for surgical activity, telephone follow-up and postoperative homecare. Admissions were grouped according to their demographic

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characteristics, surgery data, clinical data, homecare premedication, evaluation before surgery, ASA physical status, type of surgery, type of anaesthesia, duration of surgery and anaesthesia.

Admissions were analyzed according to diagnosis and discharge check-up, and were grouped according to surgical or anaesthetic cause, pain, vomiting and coexisting medical problems. Each group was divided into subgroups.

Admissions for infections were analyzed in a separate group which collated age, ASA physical status, surgical procedure, symptoms, culture, time lapse between discharge and admission and the length of hospital stay in days.

The ASA physical status was assigned during the preoperative consultation, in accordance with the classification of the American Society of Anesthesiologists, which is divided into five levels: ASA physical status I is a healthy patient; ASA physical status II is the equivalent of mild underlying disease without functional impairment; ASA physical status III represents severe systemic disease that interferes with daily function; ASA physical status IV is severe life-threatening disease; and ASA physical status V is the patient unlikely to survive 24 h, with or without surgical intervention. Only patients in ASA physical status I, II and III were candidates for ambulatory surgery. The type of surgery was classified under related diagnosis groups.

The anaesthetic technique was divided into six categories: general anaesthesia, spinal, epidural, retrobulbar (RTB) and brachial plexus blocks, local anaesthesia supplemented by sedation. Surgery time was divided into three categories: (1) 20 min or less; (2) 21–40 min; and (3) over 40 min.

3. Results

In the Ambulatory Surgery Unit of Viladecans Hospital in Barcelona 7006 patients underwent day-care surgery between October 1990 and January 1997. There were 108 hospital admissions in 104 patients (1.54%), four patients being admitted twice, once immediately and once after discharge.

The mean age in years (\pm S.D.) of the patients admitted was 38.36 ± 18.68 , ranging from 3 to 93, with a mode of 32; 49.1% were male and 50.9% female.

Some days before the operation 88.9% of the patients were assessed by the anaesthesiologist, and 77.4% received premedication at home. As regards ASA physical status, 36.1% were ASA class I, 57.4% were ASA class II and 6.5% were ASA class III.

We evaluated the relationship between the need for admission and the type of surgical procedure used. The percentage of admissions for each procedure are described in Table 1.

Table 1
Admissions according to surgical procedure

Surgery type	Admissions/total number	Percent
Haemorrhoids	6/19	31.5
Inguinal hernias	26/364	7.1
Anal surgery	5/77	6.4
Adenotonsillectomy	5/89	5.6
Strabismus	1/20	5.0
Gynaecological laparoscopy	18/418	4.3
Extraction osteosynthesis material	3/82	3.6
Gynaecological:	9/302	2.9
Curettag	1	
Conization	4	
Voluntary interruption pregnancy	2	
Bartholin's cyst	2	
Septoplasty	2/82	2.4
Phimosis	3/143	2.0
Pilonidal cyst	7/354	1.9
Arthroscopy of knee	4/233	1.7
Colonoscopy	1/90	1.1
Superficial tissues	3/292	1.0
Epidydimus	1/91	1.0
Cataracts	13/2015	0.64
Carpal tunnel syndrome	1/315	0.3

The surgical procedures with more frequent admissions were haemorrhoids, inguinal hernias and anal surgery.

The mean surgery time of patients admitted (\pm S.D.) was 44.31 ± 25.74 min, ranging from 5 to 135 min, with a mode of 30 min. In 41.7% of admissions, the intervention lasted over 40 min, in 44.4% it lasted 21–40 min, and in 13.9% it lasted 20 min or less.

General anaesthesia was applied in 39.7% of cases admitted (26.8% total intravenous anaesthesia and 12.9% inhaled), epidural anaesthesia in 18.5%, spinal in 15.8%, local anaesthesia supplemented sedation in 15.7% and retrobulbar in 10.1%. In Table 2 we can see the admissions according to type of anaesthesia, with percentages of total numbers for each type of anaesthesia. Intubations were performed in 40.7% of the admissions and narcotics were administered to 48.8%.

There were surgical complications in 42.5% of the admissions: 17.5% presented with haemorrhage, and in 13% pain which could not be controlled by non-narcotic analgesics.

Table 2
Admissions according to type of anaesthesia

Type of anaesthesia	Admission/total	Percent
Local + sedation	17/2445	0.7%
General	42/1481	2.8%
Spinal	18/366	4.9%
Epidural	20/397	5.0%
Retrobulbar	11/2015	0.5%

Table 3
Admissions due to infections

Age	Year	ASA	Surgical procedure	Admission (days) after discharge	Days spent in hospital
40	1991	I	Haemorrhoids	8	3
50	1991	III	Perianal tumor	3	3
53	1992	I	Inguinal hernia	3	22
47	1992	II	Infraumbilical mesh rejection	2	5
29	1994	II	Inguinal hernia	2	9
27	1995	II	Meniscectomy arthroscopy	5	25
79	1995	II	Cataract	3	15
22	1996	I	Pilonidal	6	2
49	1996	I	Haemorrhoids	1	10

Infections were observed in 8.3% of the patients (Table 3). Finally, 7.4% of admissions had emetic symptoms which were not controlled by treatment; general anaesthesia had been administered to 70% of this patient group.

The length of hospital stay in those patients admitted

Table 4
Causes of hospital admissions (1990–1997)

Causes of admissions	No.
Surgical complications	(46)
Haemorrhage	19
Surgical infection (1 staphylococcal sepsis)	8
Surgical extension, greater complexity	7
Additional surgery	3
Suspected intestinal loop perforation	4
Feverish syndrome related to surgery	2
Postsurgical uveitis	1
Detached retina	1
Deep venous thrombosis+articular effusion	1
Anaesthetic complications	(17)
Accidental spinal anaesthesia in RTB ^a	3
Dural puncture in epidural anaesthesia	3
Anaesthetic emergence delay in general anaesthesia	4
Delay in spontaneous micturition in spinal anaesthesia	4
Urinary retention in spinal anaesthesia	2
Prolonged motor and sensory weakness in spinal anaesthesia	1
Pain	(14)
Non-compliance with facility protocol	(12)
Selection	5
Schedule	7
Vomiting	(8)
Coexisting illnesses	(7)
Hypertension	3
Lipothymia	3
Hyperglycaemia	1
Feverish syndrome unrelated to surgery	(4)
Urinary origin sepsis through <i>E. coli</i> after vesical probing	1
Urinary infection unrelated to surgery	1
Common cold	2

^a RTB Retrobulbar anaesthesia.

immediately after ambulatory surgery ranged from 1 to 9 days, with a mean of 1.54 days. In those admitted after discharge, the period between discharge and admission ranged from 1 h (through haemorrhage) to 3 months (cataract with dislodged retina), with a mean of 6.9 days. The mean stay in these cases was 5.28 days, ranging from 1 to 24 days.

There were no perioperative deaths in any of the patients studied. The causes of hospital admission are noted in Table 4. The number of admissions due to surgical causes divided among seven surgical departments, are seen in Table 5. The admissions for anaesthetic reasons in patients who underwent spinal anaesthesia are described in Table 6; admissions with a delay in anaesthetic emergence under general anaesthesia (Table 7); admissions due to pain, with the type of surgery and anaesthesia are shown in Table 8.

4. Discussion

Unanticipated hospital admission following ambulatory surgery has long been recognised as a valuable measure of morbidity and quality.

The success of an ambulatory surgery unit may be equated to its number of unanticipated hospital admissions.

The percentage of admissions varies from one unit to the other, but the highest percentages (by up to 10-fold) are found in Hospital-affiliated centres [1,2]

Table 5
Admissions due to surgical complications according to specialities

Sevices	Admissions (n)	Operations (n)	Percent
Digestive	1	44	2.27
Gynaecology	19	890	2.13
General surgery	15	1141	1.31
Otolaryngology	4	751	0.53
Orthopaedic-traumatology	3	1206	0.24
Ophthalmology	3	2066	0.14
Urology	1	908	0.11

Table 6
Admissions in spinal anaesthesia patients

Year	Age	ASA	Local anaesthetic	Surgical procedure	Cause
1995	42	II	Prilocaine 5%	Inguinal hernia	Emergence delay
1996	31	II	Prilocaine 5%	Haemorrhoids	Urinary retention
1996	49	II	Prilocaine 5%	Inguinal hernia	Micturition difficulties
1996	47	I	Prilocaine 5%	Inguinal hernia	Micturition difficulties
1996	57	II	Prilocaine 5%	Inguinal hernia	Micturition difficulties
1996	54	II	Lidocaine 5%	Inguinal hernia	Micturition difficulties
1996	40	II	Prilocaine 5%	Inguinal hernia	Urinary retention

The percentage in the Viladecans public hospital was 1.54%, a figure comparable to the percentages presented in other published series, which range from 0.68 to 4.1% [3,4]. We must bear in mind that the number of admissions also depends on the discharge criteria established by each unit.

In our unit, the criteria which the patient must satisfy include the following: the same cognitive capacity and cardiovascular and respiratory stability as presented before the intervention; capable (commensurate with age) of walking, dressing, keeping down a diet, urinating, and being aware of surroundings. Pain must be of a degree controllable by oral analgesics.

Additionally the patient and family should wish to go home as previously planned. Easy access to the hospital, both by phone and in person is essential. Refusal of a patient to go home would in itself be a reason for admission, without additional cost.

During the first 3 years of the unit's operation 11% of patients were admitted (12), even though they fulfilled the requirements for discharge as outlined above. Their admission was occasioned by non-compliance with the protocols for schedules and patient selection then in force. This measure was adopted by all physician members of the unit in order to avoid any unnecessary risks and to ensure that the unit could operate safely. We have to bear in mind that ambulatory surgery was then a new system and that there was no experience in Spain of several types of surgery in this context, on a sustained or permanent basis.

4.1. Admissions due to surgical complications

Surgical complications accounted for 42.5% of admissions in the period studied in the ambulatory surgery unit (Table 4), a figure comparable to those in the international literature, which vary from 39% [5], 57.5% [6] and 70.7% [7].

Haemorrhoidal surgery required the most admissions (Table 1), with 31.5%. Haemorrhage was the most common surgical complication, followed by extension of the surgical procedure due to unforeseen complexity or additional surgery. Both these findings concur with other published series [5,7].

Infections of the surgical wound deserve special attention as, surprisingly, these are absent from the wide-ranging series published on the causes of admissions in ambulatory surgery [5–7]. Holtz et al. [8] conclude, after reviewing the literature on the current state of postdischarge surveillance of nosocomial infections of the surgical wound, that the control methods being used by health centers are inadequate, and, moreover, that the Centers for Disease Control and the Joint Commission for the Accreditation of Healthcare Organizations currently have no strong guidelines on the subject. These authors stress the need for a postdischarge control program in order to validate the surveillance of postoperative complications in ambulatory surgery. Sands et al. [9] state that 84% of surgical infections occur after discharge, that the routine surveillance methods for infection in ambulatory surgery have

Table 7
Admissions due to delay in emergence in general anaesthesia

Year	Age	ASA	Surgical procedure	Inhaled	TIVA ^a	Opioids
1991	35	II	Carpal tunnel syndrome	Yes	No	Yes
1993	36	II	Tied fallopian tubes	Yes	No	Yes
1995	3	II	Adenotonsillectomy	Yes	No	No
1996	3	II	Adenoidectomy	Yes	No	No

^a TIVA total intravenous anaesthesia.

Table 8
Admissions due to pain

Year	Age	ASA	Type of surgery	Type of anaesthesia
1990	21	II	Inguinal hernia	Inhaled
1991	41	II	Tied fallopian tubes	Endovenous
1991	32	I	Haemorrhoids	Epidural
1991	52	II	Inguinal hernia	Epidural
1991	37	I	Inguinal hernia	Epidural
1992	46	II	Crural hernia	Inhaled
1992	24	II	Removal femoral Kuntcher's rod	Endovenous
1993	69	II	Inguinal hernia	Intradural
1994	13	I	Phimosis	Inhaled
1994	45	II	Giant lipoma	Endovenous
1995	57	II	Inguinal hernia	Intradural
1996	37	I	Knee arthrotomy	Intradural
1996	29	I	Inguinal hernia	Intradural
1996	51	II	Inguinal hernia	Intradural

not been validated, and that 63% of infections are treated outside the surgical unit. The percentage of infections of the surgical wound in our unit was 7.4% (8).

Finally, there was a noteworthy case of deep venous thrombosis after arthroscopic knee surgery. In 1996 we introduced a protocol for the administration of prophylactic doses of low molecular weight heparine in the types of patients and types of surgery considered to be at risk from thromboembolism. This is begun on the day of surgery until the patient is able to walk normally, or until the end of the first postoperative week.

4.2. Admissions due to anaesthetic causes

Admissions due to anaesthetic causes represented 15.7%, a figure similar to the 14% reported elsewhere [6].

The principal cause was a delay in anaesthetic emergence in 11 patients (10%), of which four were subjected to general anaesthesia and seven to spinal anaesthesia (four cases presented a delay in spontaneous micturition which was unresolved at the unit's closing time, one patient had prolonged motor and sensory weakness which lasted more than 6 h from the start of the spinal anaesthesia and two cases of urinary retention), difficulties in micturition made up 5.5% of the total percentage of admissions, comparable to the 5.1% of the series of Gold et al. [5].

Accidental spinal anaesthesia during the application of retrobulbar anaesthesia was the cause of 2.7% of admissions (3/2015). The risk of this happening (0.15%) confirms other authors' findings that the morbidity of this technique is extremely limited [10]. This problem was successfully solved in every case by the provision of cardiocirculatory and ventilatory backup for approximately 60 min.

Finally, there were three admissions due to accidental perforation of the dura in epidural anaesthesia; only one

of these resulted a postspinal headache, (1/397 or 0.2%), which was overcome by rest in a supine position, and the administration of analgesics and hydration over 3 days. Likewise, in a series of 682 epidurals, Sarma et al. [11] observed 0.3% of dural punctures with headaches, which required the application of a blood patch for relief of postspinal headache.

4.3. Admissions due to pain

Postoperative pain is still a problem in some types of surgery. In our study, the percentage of admissions due to pain was 13% (14), an intermediate rate in comparison with those of other publications, which range from 18.5% to 8.8% [5,7].

4.4. Admissions due to vomiting

Intractable vomiting is a significant cause of admissions in ambulatory surgery, with levels of up to 36% in some centers, and it is the principal cause of complications in the postanesthesia care unit in other centers [12,13].

The percentage of admissions due to vomiting in our unit was 7.4% (8); this low rate can be a result of the following factors: the homecare administration of anxiolytics the night before the operation; the administration of blockers of H₂ receptors in patients at risk of bronchoaspiration (due to diabetes, obesity, hiatus hernia, a history of ulcer, etc.); and premedication with endovenous droperidol 0.014 mg/kg 5–10 min before induction in all patients receiving narcotics. Moreover in the majority of lower abdominal surgery cases, with the exception of gynaecological laporoscopies we administered local-regional anaesthesia.

5. Conclusions

The percentage of admissions in our unit is comparable to ambulatory surgery units in other countries.

Vomiting was not major cause of admission; principal causes of admission were haemorrhage and pain.

Infection is a cause of admission following ambulatory surgery.

Gathering data on admission due to infection presents a challenge as this complication appears after discharge and subsequent treatment, in many cases, takes place in a centre distinct from the original ambulatory surgery unit.

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