RESULTS OF AN OUTPATIENT MAJOR SURGERY PROGRAM IN OPHTHALMOLOGY

RESULTADOS DE UN PROGRAMA DE CIRUGÍA MAYOR AMBULATORIA EN OFTALMOLOGÍA

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ABSTRACT

Purpose: To evaluate the outcomes in our hospital of an ambulatory major surgery program in patients with a variety of different ocular pathologies.

Method: This retrospective study includes 13,878 patients who underwent programmed surgery by the Department of Ophthalmology between September 1998 and December 2004. Different ophthalmological surgical procedures were performed as outpatient surgery in 11,187 patients, with cataract surgery (phacoemulsification) being the most frequent operation performed (8,155 cases). We have analysed several indicators (substitution, suspension, admission and readmission rates), as well as surgical yield and systemic and ocular complications which appeared within 72 hours after surgery. The variables were measured as relative frequencies. The evolution of complications during the study period was analysed by the Chi-square trend test.

Results: 13,878 patients had ophthalmic surgery during the study period; 11,187 had outpatient surgery with a global substitution ratio of 80.6%. The median surgical yield was 74.36%. The admission rate after surgery was 4.46% (499 patients), with 92.18% (460) of these requiring immediate admission. Twenty-one patients suffered from severe

RESUMEN

Objetivo: Evaluar los resultados de un programa de cirugía mayor ambulatoria en pacientes intervenidos quirúrgicamente de diversas patologías oculares en nuestro hospital.

Métodos: Este estudio retrospectivo incluye 13.878 pacientes intervenidos de forma programada por el Servicio de Oftalmología desde septiembre de 1998 a diciembre de 2004. En 11.187 pacientes se realizaron diferentes procedimientos quirúrgicos de forma ambulatoria, siendo la cirugía de catarata (facoemulsificación) la operación mayoritaria (8.155 casos). Se han analizado diversos índices (sustitución, suspensión, ingresos, reingresos), así como el rendimiento quirúrgico y las complicaciones sistémicas y oculares que surgieron dentro de las primeras 72 horas tras la cirugía.

La medición de las variables se realizó mediante frecuencias relativas. El análisis utilizado para la evolución de las complicaciones en el período de estudio fue la Chi cuadrado de tendencias.

Resultados: 13.878 pacientes fueron intervenidos en el período indicado, de los que 11.187 se operaron de forma ambulatoria (índice de sustitución global del 80,6%). El rendimiento quirúrgico medio fue 74,36%. El índice de ingresos tras la cirugía fue

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INTRODUCTION

At present, most of the ophthalmological surgeries, including particularly cataract surgery, are generally carried out with outpatient surgical models. The anesthetic techniques utilized in ophthalmology are varied: general, locoregional, topical and intrachamber.

Even though the optimum requirements for selecting patients are adequately fulfilled, there is a small percentage of complications which can arise after the patient has been sent home, caused by the surgery itself or by preexisting diseases exacerbated by the surgical-anesthetic intervention. Even so, mortality is virtually nil and the rate of complications very low.

SUBJECTS, MATERIAL AND METHODS

This retrospective study was carried out in our hospital, with its own independent circuit for ophthalmological patients. The area of influence of our center comprises 325,000 inhabitants within a range of 160 km. The period of this study is from Sept. 1998 to Dec. 2004, in which 13,878 patients were operated by the ophthalmology service. Of these, 11,187 operations were on an outpatient basis. Cataracts surgery was performed in 8,155 patients and vitrectomy pars plana in 557. The rest of interventions comprise other ophthalmological pathologies such as keratoplasties (133 cases), amniotic membrane transplants (55 patients), glaucoma surgery, strabismus, lacrimal pathways and oculoplasty.

The inclusion of ophthalmological patients candidates for CMA as regards the preop assessment followed the same standards as for traditional surgery patients, with lab tests (hemogram, basic coagulation study, glucemia and urea, as well as other specific tests depending on associated pathologies), electrocardiogram and thorax X-ray. In cataracts surgery electrocardiogram and chest X-ray were not routinely carried out after the fourth year of the study, with selective requests based on clinical assessments. It must be emphasized that in the last 4 years of the study we included patients ASA III and IV for cataracts surgery after setting up complications (cardiovascular, neurological, metabolic, infectious), representing a proportional risk of 1:532. Forty-five patients had less severe complications (arterial hypertension, nausea, vomiting, vasovagal syncope) that required admission to hospital. Ophthalmologic complications occurred in 79 cases (0.56%).

Conclusions: Ambulatory major surgery (AMS) is an excellent organization model of multidisciplinary surgical assistance that makes it possible to treat well selected patients in an effective, safe and efficient manner. There is a low incidence of postoperative complications of variable severity despite following the optimum requisites, although fortunately mortality is practically absent (Arch Soc Esp Oftalmol 2006; 81: 701-708).

Key words: Outpatient major surgery, ophthalmology, phacoemulsification, complications, indicators.

Palabras clave: Cirugía mayor ambulatoria, oftalmología, facoemulsificación, complicaciones, indicadores.

4.46% (499 pacientes), siendo ingresos inmediatos en el 92.18% de los casos (460). 21 pacientes sufrieron complicaciones graves (cardiovasculares, neurológicas, metabólicas, infecciosas), representando un riesgo proporcional de 1:532. En 45 pacientes aparecieron complicaciones de menor gravedad (hipertensión arterial, nauseas, vómitos, síncope vasovagal) que requirieron su ingreso hospitalario. Las complicaciones oftalmológicas ocurrieron en 79 casos (0.56%).

Conclusiones: La cirugía mayor ambulatoria (CMA) es un excelente modelo organizativo de asistencia quirúrgica multidisciplinar que permite tratar pacientes bien seleccionados de una manera efectiva, segura y eficiente. A pesar del cumplimiento de los requisitos óptimos, existe un porcentaje pequeño de complicaciones postoperatorias de gravedad variable, aunque afortunadamente la mortalidad es prácticamente nula.
a Critical Care Unit with three beds under the Anesthesiology and Reanimation Service.

The anesthetic technique was chosen on the basis of ophthalmological criteria, endeavoring to adapt it to the admittance of outpatients. The first stage of the postop control was carried out in the Postanesthesia Recovery Unit (PRU), and subsequently in the readaptation rooms where, once the general discharge criteria are fulfilled, the patients are sent home. After being discharged, we study the criteria for substitution, surgical performance and admission or readmission causes, for a period comprised within 72 hours postop and the causes for postponing the surgery or the cancellation rates. The data are obtained from computerized records of the Urgency Service of our hospital and the CMBD database for the admissions in the study period. The computerized records related to surgery activity are done in accordance with the PLAN HP HIS and HP DOCTOR, which is part of the surgery waiting list management section of the patient information system.

The substitution index is the percentage of interventions carried out in CMA regime in the ophthalmology specialty against the total number of ophthalmological surgical interventions. The surgical performance is defined as the percentage of occupancy or utilization of operating rooms. The admission index summarizes the unplanned hospital admissions in the Postop Reanimation Unit (PRU), defined as immediate admissions, or in the Readaptation Room, considered as late admissions.

The readmission index measures the hospital admissions due to complications after being discharged.

In turn, the suspension index is defined as the interventions which were not performed on the established date. The index is divided in 3 large groups: suspensions attributed to institutional reasons (programming error, change in reports, lack of instrumental, faulty preparation, lack of time), reasons attributable to the patient (rejection of surgery and no appearance) and medical reasons (intercurrent disease, lack of surgical indication, retrobulbar hematoma, absence of surgeons or anesthetist, rejection by the Anesthetics Service).

At the time of admission in the Unit, all patients received a report as well as specific postop recommendations. Within 36 hours from the operation, the patients must attend the external practice of the ophthalmology service for a checkup as per the usual protocol. The variables were measured by relative frequencies. The analysis utilized for the evolution of complications in the period of the study was Chi squared for trends.

RESULTS

The cohort of the ophthalmology service amounts to 13,878 patients, with 11,187 interventions made on outpatient basis, with a global substitution index of 80.6%. The progression of the number of intervened patients through the years of the study, the substitution indices and surgical activity are shown in Table I and Figure 1.

Of the 13,878 patients intervened, 6,139 were male (44.23% of the sample) and 7,739 were female (55.76%). The mean age of patients was 73.65 (SD 4.89 years). Cataracts pathology is the most frequent surgery of the series, accounting for 60.75% (8,432 cases) of all the interventions carried out by the ophthalmology service.

The amount of interventions which could not be carried out on the scheduled date amounted to 887, with a global suspension index of 6.39%. The most frequent causes were medical (371/887) (41.82% of cases) and, of these, the presence of intercurrent disease was the main cause.

The global substitution index for the period under study reached 80.6%, with a peak in 2002 when it

<table>
<thead>
<tr>
<th>Table I. Activity indices</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract surgery</td>
<td>1101</td>
<td>1,113</td>
<td>1,612</td>
<td>1,359</td>
<td>1,359</td>
<td>1,200</td>
</tr>
<tr>
<td>Pars plana vitrectomy</td>
<td>53</td>
<td>47</td>
<td>38</td>
<td>108</td>
<td>142</td>
<td>169</td>
</tr>
<tr>
<td>Surgical activity</td>
<td>67.1</td>
<td>65.3</td>
<td>69.2</td>
<td>73.9</td>
<td>77.1</td>
<td>80.6</td>
</tr>
<tr>
<td>Substitution index</td>
<td>80.89</td>
<td>86.76</td>
<td>89.83</td>
<td>90.39</td>
<td>73.01</td>
<td>67.27</td>
</tr>
<tr>
<td>Immediate admissions</td>
<td>32</td>
<td>38</td>
<td>99</td>
<td>111</td>
<td>95</td>
<td>85</td>
</tr>
<tr>
<td>Late admissions</td>
<td>5</td>
<td>3</td>
<td>10</td>
<td>15</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Admissions index</td>
<td>2.43</td>
<td>2.51</td>
<td>5.24</td>
<td>5.22</td>
<td>5.82</td>
<td>5.57</td>
</tr>
</tbody>
</table>
reached 90.39%. Subsequently it gradually went down to 67.27% in the last year, due mainly to the considerable increase of vitreoretinal surgery. The variation of this index through the period is summarized in figure 1.

The mean surgical activity was of 74.36%, with a maximum value of 80.6% in the last year of the study. Table 1 shows the variation of this indicator.

The number of patients which had to be admitted to a hospital bed, i.e., the admission index, was of 499 (4.46%). 460 cases (92.18%) were immediate admissions, while the rest were later admissions. Table 1 shows the variation of this indicator in the period under study.

Major complications such as cardiovascular and cerebrovascular accidents, severe infections and reappearance of preexisting diseases, appeared in 21 patients in the period. This means that the proportional risk of suffering a major complication in our series is of 1:532. The most frequent major complications were alterations in the metabolism of glucose (19% of all episodes). Of the 21 patients with important or major morbidity episodes, 2 (9.5%) suffered respiratory failure, mainly due to the appearance of pneumonia symptoms (1:5.593), 2 (9.5%) exhibited prolonged angor (1:5593); one (4.7%) had a heart attack (1:11.187); one (4.7%) exhibited a disorder of the central nervous system (1:11.187), and 2 (9.5%) suffered deep venous thrombosis (1:5.593).

As for minor complications such as high blood pressure, vomits and nausea which required admission, 45 patients were affected. The most frequent causes were vasovagal syncopes.

The total amount of patients admitted to the hospital from their home represents 0.59% of all the patients intervened in CMA regime.

Table 2 shows the major complications which arose in the unit and which required admission. Figures 2 and 3 indicate the progression of the major and minor complications for each year of the study on the basis of proportional risks, including the last 4 years in which ASA III and IV patients were intervened. Statistically significant differences were found in the appearance of major complications, in contrast with the rate of minor complications after the inclusion of patients with lower levels of basic health.

Ophthalmological complications represent 0.56% (79 cases), the most frequent of which was the alteration of the incision closure. Acute endophthalmitis, one of the most severe ophthalmological complications, constituted only 0.04% of cases, although it does not represent the total prevalence of postop endophthalmitis because the only cases recorded were those which appeared within 72

<p>| Table II. Major complications |</p>
<table>
<thead>
<tr>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged angor</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Non-typical chest pain</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cerebrovascular accident</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bronchial spasm</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Auriculoventricular obstruction</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hiper/hipoglucemic coma</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Thrombophlebitis</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Anaphylactic shock</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Acute pancreatitis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Decompensated cardiac insufficiency</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Tachyarrhythmia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total complications</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
hours postop. Table III lists the ophthalmological complications which occurred during the period of the study.

**DISCUSSION**

In Spain, surgery for ophthalmological patients on outpatient basis has gradually become popular. In recent years a number of operations have started to be performed in this way including cataracts, glaucoma, lachrymal apparatus, strabismus, eyelids, cornea and ocular surface (keratotomies, lamellar keratoplasty, amniotic membrane transplants and pterigium). By way of example, the 1996 INSALUD (Spain’s national health system) report shows a substitution rate of 32.3% with a mean hospital stay of 3.9 days. Ophthalmological surgery is complex but not very invasive from the systemic standpoint and few anesthetic contraindications because most interventions are carried out under local anesthesia. Ambulatory cataracts surgery involves similar visual results as the traditional models with hospital stay (1). The anesthetic contraindication in the outpatient regime is usually temporary and responds to the need of stabilizing an evolutionary disease.

The previous decade witnesses a clear reduction in the utilization of general anesthesia, which was maintained for pediatric and non-cooperative patients, and a trend towards locoregional periorcular techniques (retrobulbar, peribulbar, subtenon) and topical. In recent years, after the establishment of phacoemulsification as the usual technique in cataracts surgery, topical anesthesia has attained particular relevance. This has produced changes in the figure and functions of the anesthesiologist in the ophthalmological surgery team because he now must participate in the preop assessment of the patient and also in the prevention and treatment of peroperative extraocular complications.

The results of a powerful meta-analysis published by Archer et al (2) showed that only 1.3% of routine thorax X-rays reveal unexpected abnormalities, and only 0.1% leads to changes in the patient’s management and have no proven improvement in the end result of the surgical process. Therefore, the routine chest X-ray for cataracts surgeries in outpatients under locoregional anesthesia and sedation is unnecessary provided there is a pre-anesthetic assessment of patients and adequate selection criteria (3).

An important proportion of ophthalmological surgery patients are old people and frequently the operation represents a crucial factor to increase their autonomy because visual loss entails a considerable restriction of their daily activities. Outpatient regimes involve a smaller alteration of the habits of patients and avoid the anxiety of spending the night out of their homes.

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**Table III. Ophthalmological complications**

<table>
<thead>
<tr>
<th>Complication</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incision closure alterations (Seidel positive)</td>
<td>25</td>
</tr>
<tr>
<td>Extraocular hemorrhages</td>
<td>12</td>
</tr>
<tr>
<td>High iop/acute glaucoma</td>
<td>10</td>
</tr>
<tr>
<td>Acute endophthalmitis</td>
<td>6</td>
</tr>
<tr>
<td>Corneal epithelial defects/erosions</td>
<td>6</td>
</tr>
<tr>
<td>Non-infectious keratitis</td>
<td>6</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>6</td>
</tr>
<tr>
<td>Local allergic reactions</td>
<td>5</td>
</tr>
<tr>
<td>Suture dehiscence</td>
<td>1</td>
</tr>
<tr>
<td>Herpetic keratitis</td>
<td>1</td>
</tr>
<tr>
<td>Preseptal cellulitis</td>
<td>1</td>
</tr>
<tr>
<td>Total complications</td>
<td>79</td>
</tr>
</tbody>
</table>

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**Fig. 2: Evolution of major complications.**

**Fig. 3: Evolution of minor complications.**
The rate of admissions in the units usually ranges between 1-2% (4,5), although international literature comprises results within a broader range of 9.50% and 0.28% (6). In our study, the unplanned admission rate (4.46%) is higher than that described in other series (7) although within acceptable limits but, in contrast with said series, we have included complex procedures without time limits and restrictions related to the initial health. These results match those published by Meeks G.R et al (8) who reported an admission rate of 3.64. In this study we did not record the social causes of our admissions.

In several studies it can be verified that the rate of readmissions from the patients’ home is extremely low, under 1%, reaching in some series as low as 0.15% (7). In our study, the rate of 0.59% falls within the published ranges. Complications are not frequent due to the patients’ histories. Locoregional and topical anesthesia are free of the cardiovascular and respiratory effects of general anesthesia and allow for a greater reduction of postoperative morbidity. These results confirm the importance of this type of anesthesia in ophthalmology outpatient surgery and allow it to be considered as an efficient anesthetic and surgical technique which has become established in recent years in most health centers.

Major complications can be defined as an adverse response with the potential of causing severe damages. Minor complications entail a minimum degree of risk of causing important lesions. Studies report that major complications are not frequent and mortality is extremely low (9,10). The rates of myocardial infarct, lung embolism and cerebral alterations are very low with a prevalence as low as can be expected from the patient age group without surgical interventions (6,11,12). Events usually appear in the first two days after the operation, although it is estimated that about 40% arise between 48 hours and one month after surgery (11,13).

Mortality after outpatient surgery ranges between 1/66500 and 1/11273. In this regard, we point out the publication of a series of 1.1 million patients intervened under the outpatient regime in the United States with a mortality of 0.17/10000 (10), a rate considerably lower than those published for surgery under the traditional regime. The cornerstone is not mortality, which has lower numbers than those expected on the basis of demographic data, but morbidity linked to anesthesia and the operation (14). Mortality mainly involves very old patients and the main causes are cardiovascular. In our cohort of outpatient regime there was not a single death.

The experience gained in the outpatient regime has allowed a greater liberalization of the patient selection criteria vis-à-vis the associated pathology. This surgical mode is applicable to ASA III and IV patients having their diseases under control and are in a stable condition. The perioperative complications are more frequently related to surgery than to the medical condition (12,14-17), in contrast to ophthalmological surgery. In most series, the complications of cataracts surgery are capsule rupture, high IOP, endophthalmitis, corneal endothelial decompensation, retina detachment, suture dehiscence, anterior uveitis, posterior capsular opacification, macular edema and ocular hemorrhage (18).

Since 2001, with the introduction of more complex pathologies and patients having a deteriorated base condition, we have not found a proportional increase of the risks associated to systemic complications, observing the importance of an adequate selection of patients for the outpatient regime.

Major complications usually appear in patients with specific risk factors such as aged, obese, alcoholic and with heart or respiratory disorders in which an adequate exclusion has been performed. Most systemic complications are slight or minor, although sometime pain can be intense, particularly after vitreoretinal and strabismus surgery. These results should bring out the need of following up the analgesic protocols of all surgical patients, independently of the operation and anesthesia type. Severe pain can give rise to vomiting and in turn the treatment of pain can exacerbate emetic conditions (11,15,16), and this can lead to severe complications (suture dehiscence, intraocular hemorrhage) in ophthalmological surgery patients.

In our study the most common cause of hospital admittance is derived from alterations in glucose metabolism, with similar results to other authors (3,13,18). Vomiting and nausea are usually considered to be important causes for hospital admission (11,19). Around 90% of CMA patients had some alteration after discharge and about one third of all post-surgery complications occur within two days after the surgery.

In summary, it can be said that in our environment, with increased surgical complexity and the inclusion of patients with more deteriorated basal conditions, there has been a marked reduction in the substitution index with a statistically significant
increase of the index of admissions and readmissions due to major complications. The development of CMA involves a responsibility for all health professionals. The safety of patients is not based on being admitted or not, it is an attitude which, when the surgeon follows adequate selection criteria with a solid preanesthetic assessment, there is no reason to expect more complications than in admitted patients (20). Epidemiological and clinical studies by individualized services are needed to analyze the anesthetic-surgical morbidity and mortality in Spain, particularly in units specialized in pathologies, age groups and procedures.

REFERENCES