SPREAD OF BURN AND NON-BURN PATHOLOGIES, ANAESTHETIC SUPPORT AND SOME MANAGEMENT DATA

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SUMMARY. In this article we present the surgical activity of the Burns Service in the University Hospital Centre in Tirana. Not only burn patients but also patients with trauma and soft tissue losses are hospitalized in a burns centre, as well as patients needing plastic surgery coming from similar specialities. In 2006, 1127 patients were subjected to surgery in our service. The techniques of anaesthesia used are general anaesthesia (endotracheal tube, laryngeal mask airway, intravenous) and regional anaesthesia. An anaesthesiologist acting in the role of physician manager can add significant value to the overall operating room process by improving efficiency in resource utilization and simultaneously quality of care. We have found that giving priority to burns, including burns sequelae and other hospitalized burn patients, if possible in day surgery, can optimize the bed occupancy rate.

Introduction

The anaesthetic management of patients hospitalized in a burns centre is in principle equal to the anaesthetic management of surgical patients with some particular aspects. Nowadays, not only burn patients but also patients with soft tissue traumas and losses are hospitalized in burns centres, as well as patients needing plastic surgery coming from similar specialities. Patients suffering from burns or burns-like pathologies often require repeated surgical interventions both as emergency treatment and as reparative procedures over the years in order to correct functional and cosmetic sequelae.[1]

In this article we concentrate mainly on the presentation of the anaesthetic techniques used in the year 2006 in our Centre. We also want to report on some aspects of anaesthesia in burn and non-burn pathologies. It is important to emphasize the fact that the basic value of anaesthetic management includes not only technology and the procedures used by anaesthesiologists but also the role of anaesthesiologists in the administrative and organizational support of health care delivery.[2]

Material

Our material includes all patients operated on in our Centre in 2006. In the operating theatres we performed 1127 surgical operations, corresponding to an average of 94 operations a month or 3.1 a day.

The patients were divided into three categories. The first category included all patients needing general anaesthesia (endotracheal tube [ETT], laryngeal mask airway [LMA]. This type of anaesthesia was used in severely burned patients, patients needing reconstruction of burns sequelae, and patients with extensive tumoral processes. The first category also included patients operated on with local anaesthesia and sedation. Most of these patients were geriatric, which predetermined the choice of anaesthesia.

The second category comprised all patents needing general anaesthesia (intravenous [i.v.]) in whom the surgical procedure was not very long. This category also included some patients in whom we had difficulties when performing the anaesthesia and the operation was performed under careful monitoring with local anaesthesia.

The third category included minor interventions, mainly with local anaesthesia.

Results

Table I presents the types of anaesthesia according to their categorization. In the first category (ETT and LMA) there were 350 cases in our Centre in 2006, i.e. 31% of the total number. There were 102 cases (9%) with local anaesthesia and sedation. In the second category there were

Table I - Types of anaesthesia according to categorization

Anaesthesia/categorization	ETT	LMA	IV	Spinal	Local	Local and sedated	Total
First category	220	130	0	3	0	102	455
Second category	0	0	169	0	43	0	212
Third category	0	0	0	0	460	0	460
Total	220	130	169	3	503	102	1127

169 cases with general anaesthesia (IV), equivalent to 15% of all cases, including 43 cases (4%) with local anaesthesia. In the third category we operated on 460 patients (41% of the total number), in whom local anaesthesia was applied, generally by a surgeon.

Table II shows the types of anaesthesia used in burn and non-burn pathologies. From *Table II* we can see that the burn pathologies concerned 373 patients, or 33% of the total number, while non-burn pathologies were found in 754 patients (67%). In the burn pathologies we performed general anaesthesia (ETT, LMA, IV) in 82.5% of cases, regional anaesthesia in 16.5% of cases, and local anaesthesia with sedation in 1% of cases. In non-burn pathologies general anaesthesia was given in 28% of cases, regional anaesthesia in 59%, and local anaesthesia with sedation in 13%.

Table III presents all the burn pathologies, as follows: burns, contractures, scars, ectropions, ear deformities, burn alopecia, and post-burn foot ulcers. There were 373 patients in this group (28% of the total number), 114 with contractures (30%), and 112 with scars (30%), while other groups were smaller in number. We used general anaesthesia (ETT, LMA, IV) in 207 cases (76.6% of the total number) and local anaesthesia together with sedation in 63 cases (23.3% of the total number).

Table IV groups non-burn pathologies together, i.e. skin carcinoma, benign tumours, congenital pathologies, soft tissue traumas, fistulas and pressure sores, cosmetic surgery, and maxillofacial surgery. It can be seen that the skin carcinoma group includes 274 cases (37%) and that of benign tumours 249 cases (33%), followed by cosmetic surgery (124 cases = 16%) and a few other pathologies. We performed general anaesthesia (ETT, LMA, IV) in 211 cases (28% of the total number) and local anaesthesia together with sedation in 543 cases (72%).

Table II - Types of anaesthesia in burn and non-burn pathologies

	Burn pathologies	Non-burn pathologies	Total
ETT	91	129	220
LMA	97	33	130
IV	120	49	169
Spinal	3	0	3
Local	59	444	503
Local and sedated	3	99	102
Total	373	754	1127

Discussion

In the everyday activities of anaesthesiologists, practice management issues are assuming increasing importance, especially when the anaesthesiologists are part of a burns team, as in our Service. Anaesthesiologists can effectively apply their unique experience, knowledge, and presence to improve the quality of care, as they understand the concepts involved in balancing cost containment and outcome.

This paper concentrates on some features of anaesthetic techniques in burn and non-burn pathologies. We will also express some opinions on the assessment of anaesthetic management. We will consider three main problems:

- anaesthesia for burn pathologies
- anaesthesia for non-burn pathologies
- anaesthetic management

Table III - Types of anaesthesia for burn pathologies

Anaesthesia/pathologies	ETT	LMA	IV	Spinal	Local	Local and sedated	Total
Burns	11	12	78	0	1	1	103
Contractures	43	45	22	0	4	0	114
Scars	20	32	12	0	48	0	112
Ectropion	4	1	0	0	6	0	11
Ear deformities	4	1	0	0	0	0	5
Burn alopecia	5	3	0	0	0	0	8
Foot ulcers	4	3	8	3	0	2	20
Total	91	97	120	3	59	3	373

Table IV - Types of anaesthesia for non-burn pathologies

Anaesthesia/pathologies	ETT	LMA	IV	Spinal	Local	Local and sedated	Total
Skin carcinoma	20	4	2	0	170	78	274
Benign tumours	5	13	8	0	206	17	249
Congenital pathologies	9	7	12	0	7	0	35
Soft tissue trauma	3	9	23	0	18	2	55
Fistulas and pressure sores	6	0	0	0	0	1	7
Cosmetic surgery	76	0	4	0	43	1	124
Maxillofacial trauma	10	0	0	0	0	0	10
Total	129	33	49	0	444	99	754

Anaesthesia for burn pathologies

As said, this group collects together patients operated on for burns and burns sequelae. Patients suffering burns require surgical interventions in the acute phase of burns, which is defined as the period from the injury to wound excision, grafting, and healing.[3] These patients should present to a burns service for many years post-burn because burns sequelae have a great impact on their lives. Our data show that patients needing reconstructive surgery are twice the number of burn patients.

A correct pre-operative evaluation requires knowledge of the pathophysiological changes that occur in such patients.[4,5] The anaesthesiologist has to evaluate and treat all possible peri-operative problems when the patients are stabilized. In the shock phase, airway management is very important, especially in face and neck burn injuries.[6,7] It is necessary to assess the level of respiratory support in order to identify progressive inflammatory changes that require intubation. Other problems in this phase are correct fluid management, using the traditional endpoints of correct rehydration, the securing of vascular access, and accurate estimation of blood loss (from 0.45 to 1.25 ml/cm^2 burn area). We operated on burn patients after the shock phase. In the septic phase, i.e. the period of the disease when the inflammatory response can progress through the septic cascade, infection is one of the major challenges. Pre-operative evaluation should be performed in the context of the planned operated procedure, which will depend on the location, extent, and depth of burn wounds, the time post-injury, the presence of infection, and the existence of suitable donor sites for autografting.

As we have already stated, in burn pathologies we performed general anaesthesia (ETT, LMA, IV) in 82.5% of the cases and regional and local anaesthesia in the remaining 17.5%. If we consider burns only, there were 103 cases; general anaesthesia (ETT, LMA, IV) was given in 102 cases, while only one patient was operated on under local anaesthesia.

Regarding the choice of anaesthetic agents and techniques, we used numerous anaesthetic agents for the induction and maintenance of anaesthesia, taking into consideration their advantages or disadvantages in burn patients. In 11 cases we used ETT, in 12 cases we used LMA as a secure airway, especially in children, and in 78 cases we performed IV anaesthesia. For the induction of anaesthesia, we used ketamine rather than propofol or thiopental, because ketamine presents some advantages, e.g. it preserves hypoxic ventilation responses and airway reflexes, with or without airway instrumentation.[8] The use of succinylcholine was limited in these patients. For maintenance of anaesthesia we used volatile agents such as halothane, isoflurane, and sevorane with caution because they can cause dose-dependent cardiac depression and vasodilatation. Opioids are also used as important agents for providing analgesia in the acute phase of injury.[9,10]

With regard to anaesthesia in burns sequelae, particular problems associated with certain plastic procedures need special pre-anaesthetic evaluation, although the general evaluation is the same. In these patients we performed general anaesthesia (ETT, LMA, IV) in 206 cases and regional anaesthesia in 64 cases. ETT was used in 80 cases and LMA in 85 cases with the same priorities as ETT, while IV was used in 42 patients. LMA resolved some cases in which we had difficulties with intubation because of face or neck deformities. In such patients regional anaesthesia can be used effectively, whether associated with general anaesthesia or not. This is the reason for the greater number of patients operated on under local anaesthesia compared with burns.

Anaesthesia for non-burn pathologies

This group comprised pathologies that can also be operated on in other departments, although such patients can profit more from burns surgeons. An anaesthesia plan was developed using the basic standards of pre-anaesthesia, including physical evaluation and knowledge of coexisting diseases. Skin cancers and benign tumours were in considerable number, i.e. 523 patients, equivalent to 46.4% of the total number. Of these, only 52 patients (10%) were operated on under general anaesthesia. The others were operated on under regional anaesthesia or local anaesthesia with sedation.[11] With regard to other pathologies, they were operated on under general anaesthesia (ETT, LMA, IV) in the majority of cases. Regarding these data, it is important to underline the use in our service of day surgery. Such patients were operated and discharged from hospital on the same day.[12] We used local anaesthesia or local anaesthesia with sedation as well as IV in some cases, especially propofol.

Anaesthetic management

Anaesthetic management today is estimated on a value basis. This concept defines the relationship between the costs of anaesthetic management strategies and the value of this care as reflected by the peri-operative outcome.

Modern burn care depends on the co-ordination of a multidisciplinary team that includes surgeons, intensivists, nurses, rehabilitation therapists, and anaesthesiologists. All physicians, including anaesthesiologists, make in their everyday practice cost-conscious decisions that balance the needs and priorities of patients (risks and benefits) with limited available resources. Three major areas in which the concepts of clinical economic analysis can be applied are pre-operative evaluation, intra-operative management, and post-operative care.

We believe it is necessary to institute cost containment programmes as an objective reflection of the quality of care that is provided, especially in burns centres. These programmes consist of outcome measurement, burn treatment protocols, and the optimization of resources.[13,14] Anaesthesiologists acting as physician managers can add significant value to the overall operating room process by im-

proving efficiency in resource utilization and, at the same time, the quality of care.

As said, our patients are divided into two groups. The first includes burn pathologies combining cases of burns and burns sequelae. This group of patients has the main priority for admission to our Centre. We have found that giving priority to burns as also to burns sequelae can optimize the bed occupancy rate. The occupancy rate in a burns centre should be 0.85 or 85%, i.e. 85% of beds with burns patients and 15% unoccupied. If priority is given only to admissions of burn patients, there will be periods when the occupancy rate is 1, or 100%, which has a great impact on cost containment. Also, because of oscillations of burns over the year, the rate may drop to 0.4 or 40%, which is not normal. As patients with burns sequelae (contractures, scars, etc.) are, in the main, priority patients, hospitalization on a bed availability basis gives a great help for optimization of the occupancy rate.

The second group collects together non-burn pathologies. These patients do not present acute injuries but benefit from treatment in a burns centre. Their admission to our Centre is made on the base of elective cases, and treatment is by day surgery, which also optimizes the occupancy rate.

With regard to intra-operative management, we have to consider the costs of anaesthetic drugs and supplies, anaesthetic techniques, and the costs of monitoring. The application of value-based anaesthetic management is of great importance for the determination of the influence of various anaesthetic techniques on outcome, peri-operative efficiency, and total cost.

Conclusions

Two main categories of patients are treated in burns centres, burn pathologies and non-burn pathologies. The first of these has priority for treatment in a burns centre, while the second is used to optimize the bed occupancy rate. Value-based anaesthetic management helps to improve the quality of care. In burns centres cost-containment programmes consist of outcome evaluation, burn treatment protocols, and the optimization of resources.

RÉSUMÉ. Les Auteurs présentent l'activité chirurgicale du Service des Brûlures au Centre Hospitalier Universitaire à Tirana. Non seulement les patients brûlés mais aussi les patients atteints de traumatismes et de pertes de tissus sont hospitalisés dans les centres des brûlés, comme aussi les patients provenant d'autres spécialités similaires qui ont besoin d'une intervention de chirurgie plastique. En 2006, 1127 patients ont été traités chirurgicalement dans notre service. Les techniques anesthétiques utilisées sont l'anesthésie générale (tube endotrachéal, masque laryngé pour les voies aériennes, intraveineux) et anesthésie régionale. Un anesthésiologiste qui a le rôle de directeur des médecins peut contribuer une valeur significative au procès global de la salle opératoire en améliorant l'efficience de l'utilisation des ressources et, au même temps, la qualité des soins. Selon l'expérience des Auteurs, donner la priorité aux brûlures, y inclus les séquelles de brûlures et d'autres patients hospitalisés atteints de brûlures, si possible en chirurgie de jour, peut optimiser le taux d'occupation des lits.

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This paper was received on 16 May 2007.

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