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INFANTILE AND ADULT MORTALITY IN PRECARIOUS CONDITIONS

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ABSTRACT

Introduction: Maxillofacial surgery plays an important role in humanitarian surgery because this specialty includes common procedures such as facial reconstruction after burns, facial clefts or Noma's sequelae which do not require complex infrastructures and thus can be carried out in sub-optimal conditions. Nevertheless, there is a mortality rate during those missions and few studies evaluating their rate and circumstances have been published.

The aim of our study was threefold: to study the deaths reported during humanitarian missions, to analyze the circumstances of those deaths, and to determine the risk factors in order to propose possible adaptations in operative indications and therapeutic attitudes so that those mortalities may be avoided in the future.

Material and Method: We evaluated the early deaths (between day 0 and day 8) observed among 3,494 patients operated on during humanitarian missions conducted between 2007 and 2018 in Africa and Asia by the charity organization "Les Enfants du Noma" (EDN). Information (patient, type of surgery, circumstances of death) was collected from the medical files and by questioning the medical teams who took part in the missions.

Results: Five deaths were recorded from 2007 to 2018, representing a mortality rate of 0.14%. The deceased were between 1 and 20 years of age and the deaths occurred between the day of the surgical procedure and the third post-operative day. The causes of death were as follows: two cases of respiratory failure due to mucous plugs (one in the endotracheal tube and one in the tracheotomy canule), one cardio-respiratory failure, one bilateral tension pneumothorax and one peritonitis from several duodenal perforations.

Discussion: In order to minimize the risks of lethal complications, it is important to identify as early as possible certain high-risk situations, to ensure the adequacy of the means available, and to establish an indication for surgery by a concerted discussion among the surgeons and anesthetists involved. One of the general limitations of humanitarian missions is the lack of resuscitation facilities and the lack of availability of further exams. Rites, beliefs, superstitions, gri-gri and ancestral practices often hold a prominent place in these cultures. The absence of well-kept medical records (including personal and family histories), language barriers, large volumes of patients to manage, the inexperience of first-time teams, the lack of knowledge of the terrain and local health conditions, and an inability to empathize with patients, limit the quality of preoperative assessment and sometimes lead to poor decisions.

Keywords: humanitarian, mortality, Noma

Introduction

In 2008, 234 million major surgical procedures were performed worldwide but less than 4% were carried out in developing countries [1]. Maxillofacial surgery has an important role to play in humanitarian surgery because there are countless patients. Moreover, the surgery of burns, facial clefts or Noma's sequelae, most often do not require complex infrastructures.

Nevertheless, there is a mortality rate during missions, showing that we must adapt our operating indications and take into consideration the context and local conditions (operating rooms, hospitalization facilities, access to an intensive care unit, etc.). The occurrence of death in humanitarian surgery has significant psychological impact on the missionary teams but also on the local medical teams as well as on the patients and families encountering missionary teams for the first time. Surprisingly, few studies evaluating this mortality rate have been published.

We aimed to study the deaths during humanitarian missions, to analyze the circumstances that lead to those deaths, and to determine the risk factors, if any, in order to adapt operative indications and therapeutic attitudes, in precarious conditions.

Material and method

We evaluated the early post-operative deaths (between day 0 and day 8) observed among 3,494 patients who underwent surgical procedures (maxillofacial surgery and orthopedic surgery) during humanitarian missions conducted between 2007 and 2018 in Africa and Asia by the charity "Les Enfants du Noma". Information (patient, type of surgery, circumstances of death) was collected from the medical files and by questioning the practitioners who took part in the missions.

Results

Five deaths were recorded from 2007 to 2018, representing a mortality rate of 0.14%.

The first patient, aged one, had a cleft palate closure. There were no particular problems during surgery but on the third postoperative day, she had seizures associated with hyperthermia. She was treated empirically with quinine (Atovaquine) for suspected cerebral malaria and was put on antiepileptics to control the seizures. Reintubation was necessary due to her low conscious state in order to protect her airway. Despite that, she died on the third postoperative day, in the recovery room, as a result of the formation of a mucous plug in the intubation tube.

The second patient, aged twenty, was treated for the removal of a right palmar tumor. During the procedure he suddenly developed bradycardia and cardio-respiratory arrest and died intraoperatively despite resuscitation efforts. When the health care team asked for the family history secondarily, cases of sudden death were reported.

The third patient was a twenty-year-old man with burn sequelae which required the release of a mento-sternal synechia with a skin graft to recover cervical extension (Fig.1). Immediately after surgery, the patient developed a bilateral tension pneumothorax of unexplained origin. The ensuing reintubation was difficult (a long and traumatic intubation despite the use of fiberoptic intubation equipment). This was followed by secondary cardiovascular failure, 8 hours after the pneumothorax which caused his death on the day of surgery.

The fourth case was that of a nine-year-old girl, previously operated on 18 months earlier, for a facial defect following a road traffic accident (Fig.2). During this surgery, there were substantial intubation and extubation difficulties and it was decided that the patient should not undergo any further surgical procedures. At the following mission, the family used false identity papers (no medical history could be found) and presented the child to a new team for a flap of the upper lip. Immediately after this surgical revision, she presented major ventilation and intubation difficulties (restrictive syndrome from tracheal narrowing-stenosis). Accidental intraoperative extubation was treated with an emergency tracheostomy. However, hypoxia caused cerebral anoxia and post-hypoxic seizures (convulsions). She died on day one from what appeared to be some plugging of the tracheotomy.

The last case concerned a one-year-old girl who was managed for a bilateral facial cleft 7, associated with a complex malformation of the lower lip (Fig.3). There were no problems during surgery. On day 1 she suddenly presented a surgical abdomen and was operated on by the local pediatric surgery team, who confirmed peritonitis from several duodenal perforations. Despite a transfer to the pediatric intensive care unit of Charles de Gaulle General Hospital in Ouagadougou, death occurred on the third postoperative day due to severe septic shock. When her parents were questioned further, the local team found out that they had resorted to local rituals, including the ingestion of toxic tree barking in order to protect the child from the risks of surgery.

Discussion

The analysis of our different cases also shows us the importance of a thorough and exhaustive preoperative evaluation in order to ascertain the personal and family histories of the patients.

There have been a few studies which describe mortality rates in humanitarian missions in developing countries. In 1991, out of 17,036 operated cases (digestive, traumatology, maxillofacial surgery, etc.), the mortality rate was 3.3% [2] versus 1.2 % in 1993 [3] and 1% in developed nations in 1996 [4]. In 2010, the "Médecins sans Frontières" (Doctors without Borders) teams counted 19,643 surgical procedures over 8 years, with a mortality rate of 0.2% [5]. Finally in 2015 a study conducted between January 2012 and December 2013 reported 59,928 surgical procedures (trauma surgery, gynecological emergencies and "minor" surgeries) carried out in 20 different countries (Sudan, Yemen, Pakistan, etc.) showed an intraoperative mortality rate of 0.17% [6].

One of the first major difficulties in a precarious situation is dealing with the shortage of equipment and resuscitation units. Difficult access to intensive care and lack of equipment for difficult intubations were the leading causes of death for several of the patients who died during the EDN missions. For the fourth clinical case, with the post-traumatic context, there was a risk of damage to the aero-digestive tract and a difficult intubation could have been expected. In that case, specialized intubation equipment was essential (for example fiberoptic equipment or a video-laryngoscope).

The social and sanitary precariousness of these countries is the second difficulty practitioners face. Assuming that the death of the first patient was linked to cerebral malaria, we know that this pathology is a scourge in Africa. According to the World Health Organization (WHO), it is estimated that in 2016, 216 million cases of malaria occurred in 91 countries and 445,000 deaths during the same year. Moreover, 90% of the cases of malaria and 91% of the deaths from this disease occurred in Africa. But a precise patient history adapted to the health context of the country could have enabled the care givers to detect the child's disease and to start a pre-operative antimalarial treatment and to delay the surgery for 3 days (2 days of apyrexia) whilst ensuring good management of the underlying pathology.

For our second clinical case, the medical team was informed after the death that there had previously been a family history of sudden death. However, in a developing country and with the language barrier, it can be difficult to determine if a death in a family was due to sudden death from a congenital cardiac abnormality or from an untreated, undiagnosed common illness. If there is any suspicion or even more so if there is the certainty of sudden death in the patient's family history, the medical team should obtain an additional assessment (at least a cardiac ultrasound assessment and ECG) to guide their final decision and if necessary, to justify their refusal to operate on the patient.

The death of our third patient may be related to a lack of further investigations. In developed countries, this patient would have had a preoperative chest X-ray and CT scan to assess the extent of intrathoracic flanges allowing a more precise adaptation of the surgical procedure.

For our fourth clinical case, we learned secondarily that any further surgery had been contraindicated due to intubation and extubation difficulties during a first procedure of upper lip flap (Webster on the right side and Karapandzic on the left side). During that first operation he had also presented with seizures immediately following surgery. At the following mission, the family tampered with the medical file (name change and no medical records) and presented the child to a new team for a flap of the upper lip. We can question the quality of the information delivered by the family, as well as their understanding of the situation regarding the cause of contraindication to further surgery during subsequent missions. The language barrier sometimes prevents direct dialogue with the local population and requires the teams to depend on translators whose qualifications are not always verifiable.

For our last patient, the digestive perforations were secondary to "traditional remedies". Indeed, after repeated questioning, the parents admitted having administered tree bark to ward off the risks related to the operating room to their child. It is difficult to interfere with the rituals and practices of different populations. The anticipation of this type of complication is therefore very difficult and must depend on an ongoing health education of the population.

These different clinical cases and our experience of humanitarian missions show that it is crucial in order to minimize the risks of vital complications to identify as early as possible the high-risk situations, to ensure the adequacy of the means available, and determine the cases to operate on by a concerted discussion among the surgeons and anesthesiologists involved.

According to Boston et al. [7] the solution is to identify situations with too many risk factors: patients at risk during intubation and / or extubation, ankylosis of the temporomandibular joint (TMJ), patients with major retrognathia, cervical tumors, bulky or vascular tumors, and children under 6 months of age. Those exclusion criteria represent a large proportion of the maxillofacial surgery population encountered. In our opinion each medical team has to discuss the indication and the safety to perform a surgery. It is also impossible to establish set exclusion criteria as the decision to proceed depends largely on the level of expertise of both the surgeon and the anesthetist (the pediatric expertise in anesthetics is an example) both in the medical field but also on their experience in humanitarian medicine, on the local conditions (adequate post-operative structures, access to intensive care units) and on the available equipment (fiberoptic intubation, emergency equipment etc...).

During humanitarian missions, operating conditions and the general work environment are unique and practitioners must be aware that even if their patients are generally in good health, outcomes can be unpredictable. The lack of adequate medical facilities, equipment and drugs, coupled with the presence of co-morbidities from an early age (malaria, anemia, tuberculosis, AIDS) contribute to the complexity of these missions. One of the general limitations is the lack of resuscitation facilities and access to more sophisticated exams. In addition the absence of well-kept medical records (including personal and family histories) language barriers, large volumes of patients to manage, the inexperience of first-time teams, the lack of knowledge of local health conditions, and an inability to empathize with patients limit the quality of preoperative assessment and sometimes leads to poor decision making. Moreover, imaging assessments or quality imaging are not always available, which expose people with certain pathologies such as TMJ ankyloses to a higher surgical risk. Finally, rites, beliefs, superstitions and ancestral practices often hold a prominent place in these cultures and can lead to unpredictable complications.

It is our wish to continue this work of collecting and analyzing deaths occurring in precarious conditions, and to thus provide humanitarian medical teams with specific recommendations (surgical and anesthetic) and with a checklist of equipment to ensure missions occur in the best conditions. We must analyze every death or critical situation in order to continue to carry out, beyond our borders, our duty to care for others, while respecting our professional ethics.

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Fig. 1: Facial and cervical sequelae of burns in a 20-year-old patient



Fig. 2: Preoperative frontal photographs of a 9-year-old child with the effects of a public road accident



Fig. 3: Preoperative photographs of a 1-year-old child with bilateral facial cleft 7 with lower labial malformation