

OCULAR INJURIES IN PATIENTS UNDER PROLONGED MECHANICAL VENTILATION AND ITS RELATIONSHIP WITH NUTRITIONAL STATUS

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ABSTRACT

History: Ocular injuries are common complications in critically ill patients, related to multiple factors such as the effects of mechanical ventilation, use of sedatives, and lack of eye care. Aim: To carry out the study of ocular injuries in patients with prolonged mechanical ventilation according to nutritional status for the prevention of ophthalmological injuries at the Western Regional Hospital (HRO), Quetzaltenango, Guatemala. Material and methods: Observational, prospective, cross-sectional and correlational study with a mixed approach, in 18 patients who met inclusion criteria, from May to October 2023, using a structured instrument for data collection. Results: It was evident that the main ocular injury is exposure keratopathy, the signs of ocular injury appear mainly in men, the corneas were the most affected, with corneal ulcer being 40%, followed by lesions in the conjunctiva, the main anomaly. was conjunctival hyperemia with 48%, a Schirmer test was performed, presenting 67% and 61% of patients without significant production of tears to moisturize the right and left eyes respectively. In relation to nutritional status, it was observed that ocular lesions did not increase regardless of the BMI result. Discussion. In relation to the results, it was determined that nutritional status is not a determining risk factor for the development of ocular lesions in patients admitted to the Intensive Care Unit (ICU), But it is important to develop a care protocol to prevent these injuries.

KEYWORDS: Ocular injuries, mechanical ventilation, nutrition.

INTRODUCTION

Critically ill patients admitted to an Intensive Care Unit (ICU), with a potentially fatal risk related to adjacent comorbidities, are predisposed to developing ocular injuries by not receiving adequate preventive care. In the ICU we seek to preserve the life of the patient, through controlling processes infectious agents to protect target organs such as the brain, heart, kidneys, liver and lungs, this has an impact on the neglect of care for non-vital organs such as the eyes.^[1]

It has been reported that between 20 – 40% of ICU patients develop ocular complications, which can progress to irreversible eye damage.^[2]

The interest in developing this research arises because in Guatemala there is no specific protocol for eye care in patients admitted to the ICU. This research was carried out with the purpose of finding relevant results that allow

the development and subsequent implementation of said protocol. In other countries, the application of these protocols has shown that ocular complications are significantly reduced.^[3,4]

This represents a benefit in the quality of life of patients; an important future economic impact on the institutions, because no secondary expenses are incurred in the treatment of these injuries. Likewise, an analysis of the nutritional status of the patients was carried out to determine if this has an impact on the development of ocular lesions in ICU patients. This allows for a global treatment, if patients require specific nutritional therapeutic measures.

METHODOLOGY

The present investigation is observational, correlational, the external ocular anatomy of individuals admitted to the ICU was evaluated, in search of the incidence of

ocular injuries during their hospital stay; The nutritional status of each patient was evaluated, along with weight proportion data upon admission and during data collection, to determine if the hospital stay in the ICU would highlight data on the alteration of nutritional status (malnutrition or obesity), correlating it with the manifestation of ocular injuries.

It was decided to carry out this research due to the importance of eye care for patients in intensive care, to improve their quality of life when they leave the hospital. In Guatemala, there is a thesis entitled Nutritional status of the critically ill patient: implication in mortality from the University of San Carlos of Guatemala, Guatemala, in which a significant association is established between nutritional status and complications in general that affect the evolution and patient recovery, however, there are no studies on ocular lesions or whether nutritional status increases the risk of the appearance of these signs.^[5]

Design of the investigation

The design of this research is observational, correlational; Because there was no manipulation of the patients admitted to the ICU, no tests or studies were performed outside the room where they were located and no laboratory tests were performed to be evaluated later. According to Argimón *et al.* (2013), observational or non-experimental studies are “studies in which the study factor is not controlled by the researchers, but rather they are limited to observing, measuring and analyzing certain variables in the subjects” (p. 30).^[6]

Research or proposal focus

The research approach is mixed, it was determined what the ocular injuries were in patients with prolonged mechanical ventilation according to the nutritional status for the prevention of ophthalmological complications in the adult ICU, at the Western Regional Hospital HRO, Quetzaltenango, Guatemala. The risk factors to which patients in the ICU are exposed to develop ocular lesions were identified, the nutritional status of the patients was also classified; and finally the relationship between prolonged mechanical ventilation and ocular injuries was established.

Variables

The variables studied during the process of this research were: ocular injuries, intensive care unit, patients, nutritional status, prolonged mechanical ventilation; in order to obtain results for research analysis.

Study population

The number of beds available in ICU A, B and Adult Surgery of the HRO, Quetzaltenango, was taken into account, where 18 patients were evaluated, who underwent basic ophthalmological tests within the aforementioned facilities in the month of May 2023.

Sample

Patients admitted to the Intensive Care Unit who are on prolonged mechanical ventilation in the HRO, Quetzaltenango, Guatemala, in the month of May 2023. Probabilistic sampling was carried out based on the following formula:

$$n = k^2 pqN / e^2(N-1) + k^2 pk$$

Where the sample was 18 patients.

Hypothesis

HO: ocular lesions are related in 75% of cases to poor nutritional status in patients with prolonged mechanical ventilation in the adult intensive care unit, HRO, Quetzaltenango, Guatemala.

HI: ocular lesions are not related in 75% of cases to poor nutritional status in patients with prolonged mechanical ventilation in the adult intensive care unit, HRO, Quetzaltenango, Guatemala.

Data processing and analysis

The information was collected through the data collection instrument, a data warehouse was formed with the responses obtained from the inspection and review of the patients' medical history, the responses were organized, a screening was carried out to identify possible errors or information. duplicate. With the results obtained, each question was analyzed by executing descriptive statistics techniques, to present the variables and their behavior in the group studied, it was processed and analyzed through the preparation of tables and graphs, the representations were made. graphs in order to exemplify the results obtained based on the research objectives.

Limits and obstacles of research

At the time of carrying out the field work, the greatest limitation was the difficult transportation of the human team to the research site; the HRO location, Quetzaltenango, Guatemala, was not accessible to all members of the team, especially those who They live in the departments of Guatemala, likewise, the availability of access to the ICU had a certain capacity, time and duration, so an extra effort had to be made to be present and comply with the requirements requested by the hospital.

Autonomy

To carry out this research, we had the endorsement of the doctor Luis Alberto Rodas, Thesis Committee, of the HRO, Quetzaltenango, Guatemala, to evaluate by means of non-invasive methods the external conditions of the patients' eyes, it is preserved in the complete anonymity the identity and data obtained from the people who were part of the study.

Research risk

Since data collection for this study was carried out by completing a questionnaire (considered an observational technique), it is classified as level 1 risk.

RESULTS

Of the total number of patients found in the ICU of the HRO, Quetzaltenango, in the month of May 2023, 83% were male and 17% were female, the predominant age group with 28% were those over 65 years of age. ; 100% of the patients were evaluated under invasive mechanical ventilation, it was determined that 61% spent between 7 to 15 days in the ICU; The main cause of admission is shock states with 28%.

Regarding ocular injuries, the main clinical sign of ocular injury was corneal ulcer with 44%, followed by the loss of corneal reflex in 40%, it was determined that 17% had injuries at the level of the eyelids, mainly

secretion in 67% of cases, 25 lesions were documented at the level of the conjunctiva, hyperemia represented 48% and conjunctivitis 28%.

The nutritional status of the patients was compared from admission to the time of evaluation, no differences were observed in the BMI data, 72% of patients had a normal nutritional status, while 28% were overweight. On the other hand, the assessment of serum albumin results showed that 61% of the patients had a high nutritional risk, blood cholesterol values determined that 11% had a high nutritional risk, according to the level of leukocytes, 39% had high nutritional risk.

Signs of ocular injury, depending on nutritional status

Table 1: Data on Signs of Ocular Lesions in Eyelids, Conjunctivae and Corneas.

Condition	Eyelid	%	Conjunctiva	%	Corneas	% Nutritional
Normal	8	45 %	9	50 %	10	56 %
> Weight	3	16 %	4	22 %	5	28 %
Total	11	61 %	13	72 %	15	84 %
No injury	7	39 %	5	28 %	3	16 %
Total	18	100 %	18	100 %	18	100 %

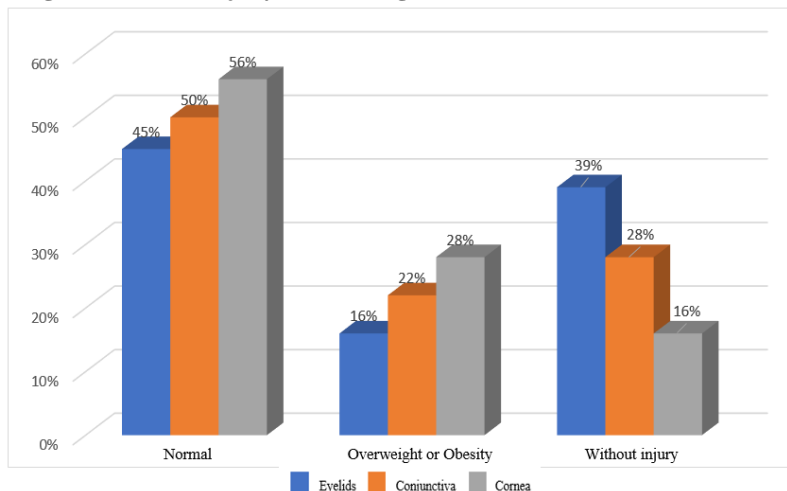
Note. Detail of the signs of ocular injury, according to the nutritional status of the research project participants. Own preparation, made with Microsoft Word.

According to the Schirmer test, patients with normal nutritional status do not produce enough tears to lubricate the eye, with 67% in the right eye and 61% in the left eye. Regarding the main clinical manifestation in the case of patients with normal weight and overweight, they were corneal lesions with 56% and 28% respectively. (See Table 1 and Figure 1).

It was identified that depending on the sex of the patients, the ocular lesions were found mainly in the corneas with 50% for men and 43% for women.

Signs of ocular injury, depending on nutritional status

Figure 1: Detail of the Signs of Ocular Injury, According to Nutritional Status.



Note. Detail of the signs of ocular injury, according to the nutritional status of the research project participants. Own preparation, made with Microsoft Excel.

admission was mostly due to traumatic events (17%), highlighting that in fact, it is men who are involved in more traffic accidents, both those who cause them or those who are victims of an accident, because the predominant age group is above 65 years of age, which shows that older adults, in addition to being the most affected, are at high risk of a prolonged stay in the ICU; in this case, 61% of patients had been admitted for between 7 and 15 days.

DISCUSSION

The results obtained from the evaluation of the patients who were admitted to the ICU Intensive Care Unit, of the HRO, Quetzaltenango, Guatemala, showed that the predominant group was male (83%), the reason for

The evaluations and data collection revealed that the most frequent signs of ocular injury occur in the cornea; ulcers (44%), absence of corneal reflection (40%) and corneal opacity (16%) were detected, followed by lesions in the cornea. eyelids, the frequent signs of ocular injury correspond to secretion (67%), edema (25%) and trichiasis (8%). At the conjunctiva level, hyperemia (48%), conjunctivitis (28%) and chemosis (20%) were observed; at the eyelid level, it was observed that a small group of patients presented at least a degree of lagophthalmos (22%), these results can be related to what Jammal et al points out. in which they reported that, in Jordan, the most common injury in the 74 patients included in the study is chemosis (54%) lagophthalmos (31%) which are significantly related to each other.^[7]

All of these injuries could be due to the greater exposure of the eyeball to the air flow, which causes dry eyes, caused by the constant evaporation of the tear film, which has protective physiological functions for the eyeball, which is why Aragón and Meneses They suggest using preventive methods for ocular complications and the effectiveness of humidity chambers (93%) and the use of lubricating eye drops (92%).^[8]

To evaluate the degree of ocular dehydration, the Schirmer test was used and it was observed that on average 64% (right and left eye) of the study subjects did not produce enough tears to maintain adequate ocular hydration, which increases the risk of signs such as corneal ulcer, chemosis and corneal opacity mainly.

Regarding nutritional assessment, the Body Mass Index (BMI) was used; Most of the individuals had a normal BMI (72%) and a small group was overweight (28%), none of them were underweight. These results are similar to those found in the Guatemalan Institute of Social Security (IGSS) by Arreaga, in which only 3.2% of patients were reported to be underweight according to BMI.^[5]

Additionally, serum markers such as albumin, cholesterol and leukocytes were explored to complement and contrast nutritional risk. As a result of the levels of albumin and leukocytes, the nutritional risk of the patients is high with (61% and 39%) respectively; However, for the cholesterol evaluation (39%) it was found within normal limits, that is, patients without any nutritional risk. The albumin results are closely related to those evidenced by Arreaga with 60.9% of patients with results less than 3.5 mg/dL for albumin.^[5]

This shows that BMI can be altered by intake and excretion in the intensive care room, however, serum markers provide reliability when detected in peripheral blood, they reflect an increase in nutritional intake, signs of infection or decreased transport of proteins.

It was found that there is no relationship between the appearance of ophthalmological lesions and inadequate nutritional status, because the increase in signs of ocular

lesions was not observed in overweight patients (15 lesions in total for 5 patients, compared to patients with normal weight (39 injuries in total for 13 patients); on the other hand, it was shown that the length of hospital stay does not influence the increase in the number of ocular injuries; the majority of the patients evaluated had a stay between 7-15 days, in this period they already present ophthalmic lesions; similar to patients who have been admitted to the service for >90 days. No previous study at a national or international level has revealed any data regarding the origin of ocular lesions in admitted patients (ICU), with prolonged mechanical ventilation with respect to nutritional status.

CONCLUSIONS

1. It was identified that the main ocular injury in patients admitted to the HRO, Quetzaltenango, Guatemala, is exposure keratopathy, determined in relation to early ophthalmological evaluation, which is essential because injuries at the ocular level can present between the first 7 to 15 days under mechanical ventilation; The clinical signs that were identified were corneal ulcer in 44%, lagophthalmos in 22%, conjunctival hyperemia in 48%, eyelid discharge in 67%, and chemosis in 20% of patients.
2. It was identified that poor ocular hydration increases the risk of corneal injuries, with the Schirmer test that evaluates the amount of tears produced by the eye, a significant deficiency was observed in relation to the right eye with the 67% and for the left eye in 61% of the cases evaluated, therefore, the use of hydrating drops is important for the eye protection of patients in the ICU.
3. No increase in signs of ocular injury was identified in patients with more than 15 days in the ICU; Therefore, a relationship cannot be established between the progress of ocular lesions and the number of days of hospital stay.
4. A normal nutritional status was identified in 72% according to the Body Mass Index (BMI), at the time of the evaluation it was determined that the percentage did not change compared to admission; It was evident that patients present ocular lesions regardless of their nutritional status.

GRATITUDE

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