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Brainstem Anesthesia after Retrobulbar Anesthesia in Cataract Surgery: A Case Report

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ABSTRACT

Brain-stem anesthesia is a serious and rare complication of orbital regional anesthesia that may occur when the local anesthetic agent gains access to the central nervous system via a direct spread from the apex of the orbit or the submeningeal pathways. We report the case of a 66 -year-old man who developed, after a retro-bulbar block for cataract surgery, a tonico-clonic seizures, hypotension and bradycardia-features of brainstem anesthesia. We present the clinical features, treatment and comments on how to prevent the problem. Although it is rare, and because it may be life-threatening in some cases, physicians who perform retrobulbar block should be aware of its features and various clinical manifestation in order to recognize and treat it. Also, facilities where ophtalmic surgery under local anesthesia are performed should be properly equiped in order to manage this complication.

Keywords: Brainstem aneasthesia, cataract surgery, retrobulbar block.

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I. Introduction

In ophthalmology, the majority of procedures are performed under local anaesthesia. It allows a shorter hospital stay, a lower risk of complications and an option for patients with a contraindication to general anaesthesia. There are several types of local anaesthesia in ophthalmology: retro-bulbar, peribulbar, subtenon, caruncular and topical.

The choice of the right type of anaesthesia depends on the surgical procedure, the patient's background, and the surgeon's choice, all of which provide comfort for the surgeon as well as safety and comfort for the patient. Locoregional anaesthesia is always preferred to general anaesthesia whenever possible as it presents less risk but not exempt from it.

We report the case of a brain stem anaesthesia in a 57 years old patient following a retrobulbar anaesthesia, in the ophthalmology department of the 20 August hospital in Casablanca.

II. Case Report

A 66 year old patient with no previous pathological history and no known systemic disease was admitted for cataract surgery. The patient was admitted to the operating room at 3pm and monitored (blood pressure and peripheral venous line).

Retrobulbar anaesthesia was performed with a 21 G needle, with a solution of lidocaine 2% and bupivacaine 0.5% with respectively 4cc and 2cc. After disinfecting the skin with betadine, the needle was inserted into the inferior point at the junction of the outer 1/3 and inner 2/3 of the

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orbital rim. After making sure that the needle was not intravascular (aspiration without blood backflow from the syringe), 4cc of the anaesthetic solution was injected, resulting in ptosis of the upper eyelid. The injection was performed without resistance. A gentle massage was performed to diffuse the anaesthetic solution. After 2 minutes of the block, the patient presented a fixed gaze followed by generalized tonic-clonic convulsive seizures maintained for 2 minutes. The patient was placed in the lateral safety position with oxygen therapy. The patient had a second seizure with a drop in blood pressure (BP 90/50 mmHg Vs 140/60 mmHg). The patient received a midazolam injection and saline filling. A blood glucose level concomitant with the seizures was performed and proved to be normal at 1.1 g/dl. Due to the hemodynamic instability, the surgery was cancelled, and the patient was intubated and admitted to the ICU for monitoring. A brain CT scan was performed without abnormalities.

The patient was extubated the next day without any deficit.

III. Discussion

Local or loco-regional anesthesia is always preferred to general anesthesia given the many advantages it offers. Even though complications are rare, they should not be overlooked as they can be life threatening. In ophthalmic surgery, retrobulbar anesthesia is a widely used effective and efficient technique.

Brainstem anesthesia is a known, described, rare and possibly fatal complication if not managed in time.

There are 3 supposed mechanisms that lead to brain stem anesthesia. The first mechanism is due to an intra-arterial injection or retrograde flow, in which case the symptoms are present almost instantly after the injection linked to the immediate intravascular flow in the cerebral circulation. The second mechanism is a systemic absorption of the anesthetic product (venous/arterial). The third mechanism, the most commonly accepted and the one incriminated in our case, is the puncture of the dura mater which leads to a diffusion of the anesthetic product in the subarachnoid space, and consequently an accumulation of the product in the meninges [1], [2]. Studies on cadavers have confirmed this hypothesis of dye reaching the brainstem after intra-orbital subdural space puncture [2], [3]. The latter is characterized by a latency between the injection of the product and the appearance of the signs because of the time necessary for the product to arrive at the level of the brainstem [2].

In the literature, its incidence is estimated at 1 in 350-1500 cases [4], [5]. Table I shows the prevalence of brainstem anesthesia in different series. Reference [5] reported that 1/700 cases were life-threatening. Reference [2] reported a BSA rate of 1.5% over 200 injections when using bupivacaine 0.75% alone and a lower rate or even a cessation of central nervous system complication with mixing bupivacaine with another anesthetic product [2].

The signs of central nervous system involvement are very diverse. They may include chills, confusion, convulsions, apnea, paralysis, loss of consciousness, hypotension, bradycardia, and nausea/vomiting [5], [6]. Neurological manifestations occur at lower blood levels of the anesthetic product than cardiovascular manifestations [1]. The time to the onset of signs after the injection of the anesthetic varies from 2 min to 10 mins [7].

Knowledge of the anatomy of the orbit and its structures and the cooperation of the patient are essential to minimize the risks despite the anatomical variations between individuals. Indeed, the primary position (looking straight ahead) appears to be the safest for performing the injection, as looking up and inwards exposes the optic nerve more [2], [7]. The size of the needle also plays an important role as it has been reported that the use of a needle smaller than 31mm is associated with less risk of brain stem anesthesia [5]. It is necessary and important to perform the injection in a setting with easy access to intensive care and resuscitation. After the anesthesia has been administered, it is necessary to monitor the patient with heart rate and oximetry in order to watch for possible complications and to be able to act in time (Fig. 2).

TABLE I: PREVALENCE OF BRAINSTEM ANESTHESIA AFTER RETROBULBAR BLOCK [2]

Study	# of injections	Prevalence (%)
[4]	6000	0.27
[8]	3123	0.79
[9]	3000	0.27
[10]	200	1.5

Know the orbital anatomy and structures
Preoperative counseling of patients about the procedure & maintenance of gaze
Maintain the eye in a neutral position (patient should look straight ahead)
Use the appropriate needle (25G, 31mm long, and possibly without cutting edge)
Proper positioning of needle and check for intravascular entry
Do not insert the needle more than 31 mm.
Do the "wiggle test"
Early recognition:Observe the patient for at least 15 minutes after the injection
Monitor with pulse oximetry, ECG*, and BP† measurement

*ECG- Electrocardiography † BP- Blood pressure

Fig. 1. Precautions to reduce the risk of complication after retrobulbar block[5].

IV. Conclusion

This case study shows that it is imperative to never minimize the potential risks of locoregional anesthesia, especially if it is potentially life threatening.

Performing this procedure with a good anatomical knowledge, in a safe place with patient monitoring, as well as knowing the early signs of a possible complication will allow a decrease in the incidence of these complications as well as a quick management of the patient.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

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