Toxic anterior segment syndrome (TASS): studying an outbreak

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Abstract

Introduction: An effect associated with cataract surgery known as Toxic Anterior Segment Syndrome (TASS) has been reported in recent years. It is an inflammatory non-infectious process which appears within the first few hours after surgery and generally resolves well with topical steroids if the course of treatment is started promptly. In this paper we describe the syndrome and analyze the possible causes for the TASS outbreak that occurred in our hospital and affected 5 patients.

Methods: As the syndrome may be due to multiple causes, the members of a research team created at the hospital reviewed all the procedures involved. The washing and sterilization methods applied to the materials were analyzed, as well as the drugs and substances used which might have caused the outbreak. We verified the substances prepared by the Pharmacy Department, specially the irrigating solution which was used in all the cases.

Results: According to the results obtained in the biochemical, microbiological, pH, osmolarity, and endotoxins assays, the solutions prepared by the Pharmacy Department were all correct.

Discussion: Since the results obtained in the analyses of the substances used were correct and no adverse effect was observed after the re-administration of the substances, we may conclude that the outbreak would be related to the washing process performed previously to the sterilization of the instrumentation used in the surgery, mainly because the recommendation to use distilled and sterile water for this purpose was not followed and, on the contrary, tap water continued to be used.

Key words: Toxic anterior segment syndrome. Cataract surgery. Balanced salt solution. Complications of cataract surgery. Endophtalmitis. Cleaning of intraocular surgical instruments.

Síndrome tóxico del segmento anterior: investigación de un brote

Introducción: En los últimos años se ha descrito una complicación asociada a la cirugía de cataratas, el síndrome tóxico del segmento anterior. Es un proceso inflamatorio que aparece en las primeras horas tras la cirugía, de carácter no infeccioso y que generalmente se resuelve bien con corticoides tópicos si el tratamiento se instaura con prontitud. En el presente trabajo se describe este síndrome y se analizan las posibles causas de un brote que tuvo lugar en nuestro centro y que afectó a 5 pacientes.

Métodos: Se creó un grupo de investigación en el centro que revisó todos los procedimientos implicados, puesto que las causas del síndrome pueden ser múltiples. Se analizaron desde los métodos de lavado y esterilización de material hasta los medicamentos y sustancias utilizadas que pudieron ser causa del brote. Entre estos últimos, se revisaron las sustancias elaboradas en el servicio de farmacia, en especial la solución salina irrigadora, utilizada en todos los casos.

Resultados: Los resultados bioquímicos, microbiológicos, de pH, osmolaridad y de endotoxinas indicaron que las soluciones elaboradas en el servicio de farmacia eran correctas.

Discusión: Dado que los resultados de los análisis de las sustancias empleadas eran correctos, corroborados con su reintroducción sin efecto adverso alguno, se llegó a la conclusión de que el brote más bien estaría relacionado con el proceso de lavado previo a la esterilización del instrumental utilizado en la cirugía, ya que no se estaban siguiendo las recomendaciones de uso de agua destilada y estéril para este fin, sino que, por el contrario, se estaba utilizando agua corriente de la red.

Palabras clave: Síndrome tóxico del segmento anterior. Cirugía de cataratas. Solución BSS. Complicaciones de la cirugía de cataratas. Endoftalmitis. Lavado de instrumental quirúrgico intraocular.

A communication about the outbreak was presented in the Conference of the Spanish Ophthalmology Society: J. Andonegui, L. Jiménez, D. Aliseda, F. Lameiro. Description of an outbreak of toxic anterior segment síndrome after vitreous surgery. 83rd Conference of the Spanish Ophthalmology Society. Las Palmas de Gran Canaria, September 26-27, 2007.

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INTRODUCTION

Ophthalmologic surgery of cataracts is, at the moment, a fast, relatively simple process and in the majority of cases, it is performed succesfully.[1,2] However, in the last few years, an adverse effect has been associated with this type of surgery, the toxic anterior segment syndrome (TASS).[3-7] It is an inflammatory process that begins in the first 12-48 h after cataract surgery or anterior segment eye surgery, which is limited to the anterior segment of the eye, cultures and Gram stains are negative and respond well to treatment with steroids.[2]

The structure that is most affected is usually the corneal endothelium and the clinical characteristics that it presents are: diffuse corneal oedema from limbus to limbus; broad endothelium damage; inflammation of the anterior segment; fibrin deposits, increase in white blood cells; including hypopyon (pus in the anterior chamber between the cornea and the iris); dilated and irregular pupils that later close and hardly dilate, and damage of the trabecular meshwork with an almost constant increase in the intraocular pressure. The most frequent symptoms include blurred vision with or without ocular pain.[2,3,8-11]

The incidence of TASS is considered to be from 0.1% to 2%.[7,12] Fortunately, the serious cases with after effects are not frequent and the mild cases improve in a few weeks and usually go unnoticed.

TASS is causes by problems of toxicity, and not sterility. Generally, any substance found in the anterior chamber of the eye can be toxic.

It must be differentiated from infectious endophthalmitis for a correct diagnosis to later carry out a correct therapeutic approach.[2-4,7,8,13]

If TASS is suspected, topical steroid treatment should be started immediately (for example: prednisolone acetate 1%) every hour, and if not, damage may end up being permanent. Endophthalmitis cannot be discarded until the response to topical steroids is clear as it is the definitive diagnosis test.[2,3,7,13]

The objective of this study is to determine the possible causes of an outbreak of TASS that took place in our centre, the possible implication of the pharmacy department, as well as the revision of the syndrome, given its emergent character.

METHODS

In March of 2007, the ophthalmology department reported 5 cases of TASS that took place in patients that underwent vitreoretinal surgery in 2 consecutive surgical sessions (2 and 3 cases, respectively), and performed by different ophthalmologists.

A research group was created, consisting of personnel from the quality control management department and the departments of preventive medicine, hospital hygiene, ophthalmology, surgery, the sterilization unit, and the pharmacy, that analysed all of the factors that could cause TASS. The material washing and sterilisation methods were studied along with the medications and solutions used, and the personnel involved in all of the processes.

Regarding the pharmacy, the substances elaborated on site: BSS irrigation solution (balanced saline solution) and intracameral cefuroxime. As a precaution, commercial BSS solution was acquired and the batches of cephuroxime used were changed.

Ophthalmic solutions should be sterile, painless (a factor that is usually associated with its pH) and neutral (isotonic with tears).[14,15] Because of this, the following analysis were repeated: pH (Beckman pH-meter, model 50-pH Meter), osmolarity (Osmo Station™, model OM-6050); and microbiological cultures were taken (in agar-blood plates during 5 days) of the batch of BSS solution used, as well as of all of the batches available. The same parameters were analysed in the commercial BSS solution as well as in the intracameral cefuroxime.

The concentration of endotoxins in the substances was also determined using the horseshoe crab (*Limulus polyphemus)* amoebocyte lysate gelification method. Standard maximum concentrations of endotoxins were not found as described by the BSS solution. In fact, in an outbreak that took place in the United States at the end of 2005, the same problem was found.[16] According to the Royal Spanish Pharmacopea, the preparations for irrigations should not contain more than 0.5 IU of endotoxins per millilitre.[17] Regarding the cefuroxime, the maximum concentration for intravenous administration was used as no endotoxin limits are available, according to Spanish Pharmacopea, 0.1 IU/mg.

Disposable surgical instruments were used when possible. However, resterilised material had to be used in all cases, making it necessary to analyse washing and sterilising methods. The material was meticulously washed, first manually and then in a sonographic washing machine, always using water from the network. The material was dried with filtered medicinal air before being sterilised using the Sterrad® method (mixture of hydrogen peroxide and plasma gas).

The sterilising equipment was revised and found to be working correctly. The surgical instrumentation was also revised, all of stainless steel or titanium which should avoid the accumulation or generation of any residues from rusting in the sterilisation process.

The research group asked the pharmacy department to analyse the water that was found at that moment in the sonographic washing machine and from that taken directly from the network for endotoxins.

RESULTS

At first, it was thought that our patients presented an infectious endophthalmitis, and a vitrectomy was performed urgently on the first patients taking microbiological cultures and treatment was given with intra-vitreous antibiotics. After receiving negative results of the microbiological cultures of the first patients and evaluating the clinical signs that they presented, a conclusion was reached that these were in fact 5 cases of TASS. They were treated