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SHORT COMMUNICATION

Orbital cellulitis following implantation of aqueous drainage devices

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PURPOSE. *Orbital cellulitis (OC) as a complication of implanted aqueous drainage devices (ADD) for glaucoma is an uncommon phenomenon. The authors report two cases of infectious OC in patients with a history of congenital glaucoma and placement of ADD.*
METHODS. *Clinical records of two patients with ADD who subsequently developed OC were reviewed for presenting symptoms, signs, medical and surgical management, and final outcome.*
RESULTS. *In the first case, an 11-year-old girl was found to have evidence of OC 9 days after the implantation of a Krupin-Denver valve. In the second case, a 14-month-old girl presented with similar findings 8 months following the implantation of an Ahmed valve. In both cases, ultrasonography demonstrated evidence of orbital inflammation and in one patient computed tomography scan was consistent with OC. In both cases, prompt institution of systemic antibiotics resulted in resolution of the clinical signs. In the first case, diagnosis was made early and the patient was promptly treated with systemic antibiotics, resulting in resolution of her symptoms without the need for implant removal. Because of the delayed presentation in the second case, an infected implant had to be removed to achieve resolution in addition to aggressive treatment with antibiotics.*
CONCLUSIONS. *Although rare, infectious OC may occur following implantation of ADD. Early recognition and intervention may be required to achieve resolution of the infection. (Eur J Ophthalmol 2007; 17: 136-40)*

KEY WORDS. *Orbital cellulitis, Congenital glaucoma, Aqueous drainage devices, Inflammation, Intervention*

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INTRODUCTION

Glaucoma is a heterogenous group of diseases requiring different methods of treatment. Aqueous drainage devices (ADD) are used in the management of refractory glaucoma not amenable to conventional forms of treatment. Some of the indications for these devices include neovascular glaucoma, failure of trabeculectomy, uveitis, epithelial downgrowth, conjunctival scarring, and iridocorneal endothelial syndrome. Although very effective in draining aqueous, both early and late complications have been reported following the implantation of these devices. Some of these complications include hypotony, failure to drain, implant migration or erosion, endothelial cell damage, cataract, and endophthalmitis (1). Orbital cellulitis (OC) is an uncommon complication of ADD implantation; only three cases have been previously reported (2-4). We report two additional cases of OC in patients who had previously undergone implantation of ADD for congenital glaucoma.

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Case reports

Medical records of all patients admitted to King Khaled Eye Specialist Hospital, a tertiary care center in Riyadh, Saudi Arabia, with clinical diagnosis of OC from January 1990 to December 2005 were reviewed for their demographic features and treatment. A total of 218 patients were treated for OC during this period. Two of these patients were found to have previously implanted ADD thought to be the cause of their OC.

In the first case, an 11-year-old girl with well-documented history of congenital glaucoma and multiple surgeries was referred for evaluation of her uncontrolled glaucoma. Her family history revealed that two other sisters had the same problem, although the parents were not related. The patient was using Propine 0.1%, Timoptic 0.5% eye drops twice daily and taking oral Diamox 250 mg three times daily. On examination, her visual acuity (VA) was counting fingers in the right eye (OD) and hand motion in the left (OS). Intraocular pressure (IOP) was 39 mmHg bilaterally (OU). External examination OD showed buphthalmos with clear cornea and deep anterior chamber. There was evidence of cataract operation with intact posterior capsule that was heavily opacified, not allowing proper retinoscopy. Fundus examination showed significant glaucomatous cupping through a hazy view due to the cloudy membrane. Examination OS revealed mature cataract, clear cornea, deep anterior chamber, and no view of the posterior pole. The patient was taken to the operating room, where a Krupin-Denver valve was implanted at the supratemporal quadrant OD. In addition, ocutome membranectomy and anterior vitrectomy was performed at the same time. Postoperatively, the patient was found to have choroidal detachment, which was observed closely, and she was discharged home 7 days after surgery with an IOP of 12 mmHg. Seven days later, the patient was brought back with sudden onset of pain and swelling OD and decreased vision to light perception. She had eyelid edema and swelling, conjunctival chemosis, limited ocular motility, and obvious proptosis (Fig. 1, A and B). Her IOP was 34 mmHg. Because of severe swelling, posterior view of the fundus was not possible and ultrasound (US) showed fluid in sub-Tenon space, increased orbital fat volume, and evidence of myositis involving lateral rectus muscle. Computed tomography scan (CT scan) showed evidence of right-sided periorbital soft tissue swelling. Right orbital fat appeared to be stippled with an enlarged right lateral rectus muscle. An implant was visible at the right supratemporal quadrant (Fig. 2). No evidence of endophthalmitis or abscess was noted. Based on clinical and imaging studies, diagnosis of OC was made and the patient was started on intravenous (IV) Gentamicin 70 mg three times daily and Cefazolin 775 mg every 6 hours. Two days later, on the recommendations of an infectious diseases consultant, antibiotics were changed to IV Flucloxacillin 750 every 6 hours and Cefotaxime 1000 mg every 8 hours, which were continued for 11 days. In addition, the patient was placed on topical Gentamicin eye drops, Pred Forte drops, and Atropine drops four times daily. Over the next 10 days the patient gradually responded to the antibiotics and did well, with resolution of the edema and conjunctival chemosis (Fig. 1C). The intraocular pressure OD was maintained at 8–10 mmHg throughout the admission and the Krupin-Denver valve im-

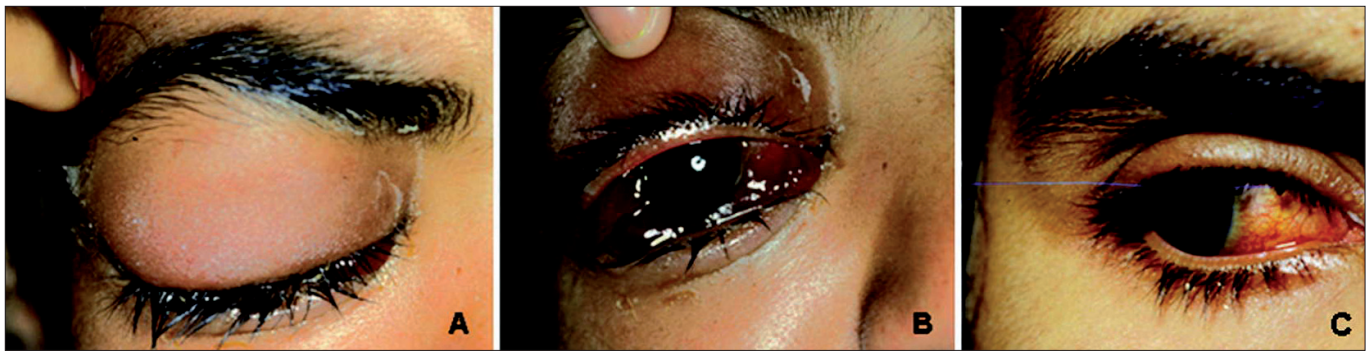

Fig. 1 - *Patient 1, 12 days after undergoing placement of Denver-Krupin valve over the supratemporal quadrant of the right eye* **(A)**. *There is evidence of eyelid edema, proptosis, conjunctival chemosis, and restricted ocular motility* **(B)**. *External photograph of the same patient after resolution of her right-sided orbital cellulitis* **(C)**.

plant seemed to be functioning. The patient was discharged on oral Ceclor 375 mg three times daily for 10 days. Six weeks later, the patient underwent implantation of Krupin-Denver valve at the inferotemporal quadrant OS. One-year follow-up examination showed the patient's vision to be hand motion OU and IOPs to be 7 mmHg OD and 10 mmHg OS with no antiglaucoma medication. Her Krupin-Denver valves appeared to be in place at the sites of implantation.
In the second case, a 14-month-old girl with a history of congenital glaucoma and multiple surgeries was referred from an area hospital for further treatment of left OC after 5 days of IV antibiotics had not improved her condition. The patients' parents were first cousins; she had two brothers and five sisters in good health. One of her brothers and one sister had congenital glaucoma for which they were being treated. The patient had undergone bilateral trabeculotomies and trabeculectomies with Mitomycin C without success. Eight months earlier, the patient had undergone bilateral two-stage Ahmed valve implantation. Two days prior to her presentation to the area hospital, she was noted to have redness and swelling OS and was found to have evidence of OC. She was started on IV Rocephin 500 mg daily and Gentamicin 20 mg twice daily as well as topical Gentamicin ointment, Chloramphenicol, and Timolol eye drops. On examination at our hospital, the patient was found to be febrile, pulse 148 per minute, and respirations 36 per minute. She had obvious swelling and redness of the left orbital area. She fixed and followed well OD, with questionable fixation OS. Examination OD showed normal eyelids and adnexa with conjunctiva, suggestive of previous surgeries including an Ahmed implant. The cornea showed some haziness, anterior chamber depth of moderate depth, and small pupil. Examination OS showed moderate eyelid swelling and erythema. Her conjunctiva was injected especially at the site of previous trabeculectomy and Ahmed implant. The cornea was hazy with whitish debris on the endothelial surface. Her pupil was small with posterior synechiae through which fundus examination was not possible. US revealed evidence of orbital inflammation, scleritis, and myositis with fluid collection around the supratemporally implanted Ahmed implant. No evidence of endophthalmitis was noted with US. Her white blood cell count was 14.4 (normal <11.0). It was believed that OC was due to an infected Ahmed implant and a decision was made to remove it. During surgery, it was found that the implant tube was pushed forward into the anterior chamber where a pocket of abscess was collected at the tip of the tube. There was a small conjunctival defect over the shaft of the tube where a streak of pus was visible. The tube was further exposed and pulled out of the anterior chamber and dissection was carried out to expose the implant which was covered by a pocket of pus. After collecting specimen for cultures, the area was irrigated thoroughly using a mixture of Vancomycin and Amikacin solution. Necrotic tissue was excised and the two edges of conjunctiva brought together by interrupted #8-0 Vicryl sutures. An anterior chamber tap was performed using a 30-gauge needle and the aspirate was sent for microbiology. Intracameral and subconjunctival injections of

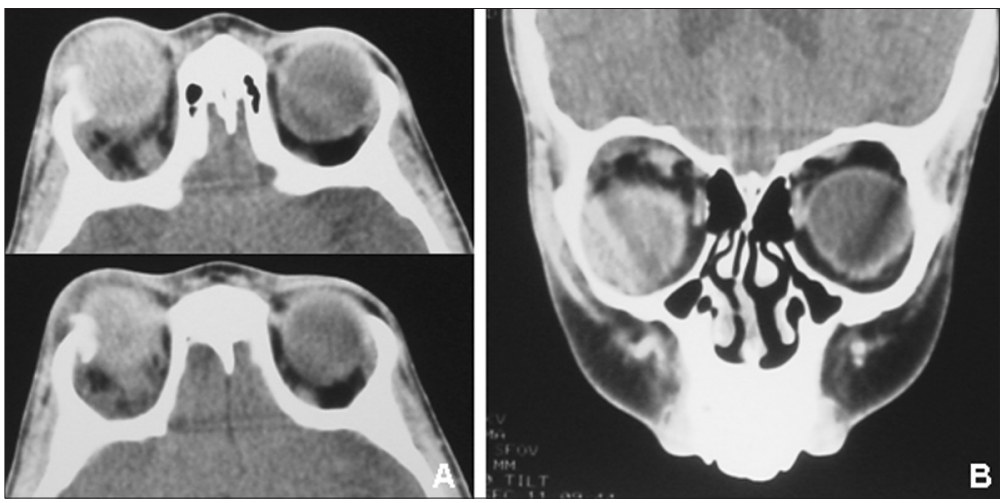

Fig. 2 - *Axial computed tomography (CT) scans showing proptosis and evidence of thickened preseptal tissues in addition to the presence of implanted Denver-Krupin valve over the supratemporal area of the right eye* **(A)**, *while coronal CT scan demonstrates inferior displacement of the globe as well as inflammation around the eye globe* **(B)**.

Vancomycin and Amikacin were administered at the end of surgery. The patient was kept on IV Gentamicin and Cephazolin as well as fortified Vancomycin and Gentamicin topical drops. Over the following several days, the eyelid edema and conjunctival chemosis resolved, anterior chamber fibrinous reaction cleared, and IOP remained in the low 20s on Timolol 0.5% twice a day. Culture results did not reveal any growth. Pathology results showed chronic inflammation around explanted Ahmed implant, confirming infection. The patient was discharged on oral Ceclor 100 mg orally three times a day for 10 days, Ofloxacillin eye drops six times a day for 14 days, and Prednisolone acetate eye drops twice for 1 week. In addition, Timolol 0.5% eyedrops twice daily were continued. Over the following 7 years, the patient was kept on topical antiglaucoma medication without any further surgical intervention. At the latest follow-up, the patient's VA was 20/60 OD and 20/300 OS and IOP was 16 mmHg OD and 29 mmHg OS on Timolol 0.5%, Xolamol, Iopidine 0.5%, and Lumigan 0.3% drops in both eyes.

DISCUSSION

Although there are a number of complications known to occur with ADD, orbital complications are few (2). These complications include cosmetically significant proptosis, silicone oil migration, and myositis (5-8). OC is unusual following implantation of ADD. To our knowledge, only three cases of OC due to ADD have been reported (Tab. I). In one case OC developed 1 month after the placement of a Molteno tube in a 1-year-old (3). In the second case, a 78-year-old woman developed OC 15 months after placement of a Baerveldt tube (4). In both of these cases, the tube had become exposed after eroding through the conjunctiva, acting as the source for the infection. In both of these cases, OC developed late after exposure and the implanted devices had to be removed. In the third case, a 44-year-old man had a severe orbital inflammation by the second postoperative day (2). Although this patient improved with systemic antibiotic administration, the authors were not sure if the early inflammation represented an allergic reaction or a true infection. Unlike the previous two cases, the implant was not removed to achieve clinical improvement. In both of our patients, systemic antibiotics were necessary to achieve resolution of infection, although in one patient implant removal was not necessary since it was not exposed. On the other hand, in the second patient implant removal was necessary because of pus around the implant and in the anterior chamber. Implant removal was necessary in addition to the systemic use of antibiotics.

We agree with previous observations that OC is an uncommon event after implantation of ADD. Considering the large number of ADD implanted at a major tertiary eye care center in the Middle East and having only two cases of such complications out of 218 cases of OC over a 15-year period attests to this rarity. Ophthalmologists should be aware that OC may

TABLE I - REPORTED CASES OF ORBITAL CELLULITIS AFTER IMPLANTATION OF AQUEOUS DRAINAGE DEVICES

Case no.	Reported cases	Age/sex	Ocular history	ADD	Time after surgery	Exposed	Management
1	Karr et al, 1990 (3)	1 yr/M	Congenital glaucoma	Molteno	1 mo	Yes	Antibiotics, implant removal
2	Lavina et al, 2002 (4)	78 yr/F	PKP,CACG,CHED	Baeverdelt	15 mo	Yes	Antibiotics, implant removal
3	Marcet et al, 2005 (2)	44 yr/M	Uveitic glaucoma	Ahmed	2 d	No	Antibiotics
4	Present study, 2007	11 yr/F	Congenital glaucoma	Krupin-Denver	9 d	No	Antibiotics
5	Present study, 2007	14 mo/F	Congenital glaucoma	Ahmed	8 mo	Yes	Antibiotics, implant removal

ADD = Aqueous drainage device; PKP = Penetrating keratoplasty; CACG = Chronic angle closure glaucoma; CHED = Congenital hereditary endothelial dystrophy

develop after implantation of ADD. This complication may occur soon after the placement of ADD, or as late as 8 months after the procedure. Risk factors for such complications should be discussed with adult patients or families in cases of children. In cases of suspected orbital infection, early referral and intervention in the form of systemic antibiotics is recommended. Implant removal may be necessary in cases where infection is too severe.

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