Anterior Chamber Tap

Diagnostic and Therapeutic Indications in the Management of Ocular Infections

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Purpose. To report three cases in which an anterior chamber tap was useful in the management of infection of the eye confined to the anterior segment. Methods. In the first case, the patient presented with diffuse conjunctival congestion and thick anterior chamber exudates adhering to the back of the cornea. The second case involved fungal keratitis, and the patient was not responding to topical natamycin and systemic ketoconazole. In this patient, infiltrate and thick hypopyon persisted despite medical therapy. The patient in the third case had a persistent thick endothelial exudate, and a retained intracameral foreign body, fungal infection, and a cataract were suspected. In all three cases, an anterior chamber tap was performed. In case 1, the exudate was removed and sent for microbiologic investigation. In case 2, the hypopyon was evacuated and intracameral amphotericin B (5 μg) was injected. In case 3, the exudate contained a wooden foreign body that was sent for culture. Intracameral amphotericin B (5 μg) was injected. Results. In the first case, the culture of the exudate grew Staphylococcus aureus. The eye quieted, and the exudate resolved following treatment with topical fortified cefazolin, fortified gentamicin, and systemic cefazolin. In the second case, smears of corneal scrapings revealed fungal filaments and the culture grew Aspergillus species. The infection resolved following an anterior chamber tap, but the patient developed a cataract. After cataract surgery, visual recovery was limited because of the corneal scar. In the third case, the culture of the foreign body grew an unidentified hyaline fungus. Following an anterior chamber tap, the infection resolved, but the cataract progressed. The patient did well after cataract surgery. Conclusions. An anterior chamber tap is an extremely useful procedure in the management of ocular infections confined to the anterior segment. The procedure should be performed under strict aseptic conditions. If the infection involves the anterior capsule of the lens, care should be taken to avoid injury to the lens, and the possibility of progression of the cataract should be explained to the patient. Key Words: Anterior chamber paracentesis—Anterior chamber tap—Infectious keratitis—Retained intraocular foreign body.

Anterior chamber paracentesis is a sparingly used procedure that has been reported useful in the diagnosis of the etiological agent in cases of infectious keratitis, endogenous fungal infection isolated to the anterior segment, fungal infection presenting as an iris inflammatory mass, and bilateral iridocyclitis. It is helpful to confirm the ocular metastasis of systemic malignancy. It is also used as an emergency therapeutic modality in the management of central retinal artery occlusion and chemical injuries of the eye. Isolated cases of complications such as infectious keratitis in the paracentesis tract and purulent anterior segment endophthalmitis following paracentesis have made this procedure less popular. We report the use of this procedure in three cases of ocular infections in which it was helpful in diagnosis and treatment.

CASE REPORTS

Case 1

A 7-year-old boy was seen on June 23, 1999 with redness and decreased vision in the right eye of 6 days duration. He had no systemic problems. On examination, he had a visual acuity of 20/50 in the right eye and 20/20 in the left eye. Examination of the right eye revealed diffuse conjunctival congestion that was more marked around the superonasal limbus. There was a thick anterior chamber exudate adhering to the back of the cornea superonasally (Fig. 1). The surrounding corneal stroma showed diffuse stromal edema. There was infiltrate involving the deeper stroma at the site of exudate. There was no epithelial defect. The anterior chamber revealed 2+ flare and cells with a hypopyon measuring less than 1 mm. The pupil was round and reactive, and the lens was clear. The anterior segment evaluation of the left eye was unremarkable. Fundus examination revealed a normal posterior pole in both eyes. A systemic examination was performed for evidence of the origin of the infection, which was not found. A diagnostic anterior chamber tap was performed on the same day under general anesthesia. The eye was cleaned and draped. The anterior chamber was entered from the temporal aspect with a 22-gauge needle. Since the exudate could not be removed, the anterior chamber was entered with no. 11 surgical blade and the exudate was removed with forceps. Smears were prepared for Gram and Giemsa stains. Blood agar, chocolate agar, nonnutrient agar, and thioglycollate broth were inoculated. Smears revealed the presence of gram-positive cocci in clusters. The patient was started on fortified cefazolin (5%) eyedrops every half hour, fortified gentamicin (1.4%) eyedrops every half hour, 1% atropine sulfate eyedrops three times daily along with an injection of 250 mg cefazolin intravenously.

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three times daily. Culture grew *Staphylococcus aureus* that was sensitive to cefazolin, gentamicin, vancomycin, and methicillin. It showed intermediate sensitivity to chloramphenicol and ciprofloxacin. It was resistant to norfloxacin. The day after initiation of therapy, the exudates in the anterior chamber and the reaction decreased. The frequency of topical antibiotics was reduced to eight times daily after 2 days. After a week of therapy, systemic cefazolin was discontinued and a topical steroid in the form of 1% prednisolone acetate eyedrops six times daily was added. The eye was quiet, and the anterior chamber exudates totally resolved (Fig. 2). The topical antibiotics were discontinued after 3 weeks of therapy, and the topical steroid was tapered.

**Case 2**

A 45-year-old woman first visited us on July 12, 1999 reporting pain, redness, watering, and decreased vision in the right eye of 2 weeks’ duration. There was no history of injury to that eye. On examination, she had visual acuity of counting fingers at 3 meters in the right eye and 20/20 in the left eye. In the right eye, there was diffuse conjunctival congestion. The cornea showed a central infiltrate measuring 3.4 x 4.4 mm with an overlying epithelial defect and surrounding stromal edema. The anterior chamber had 1.5 mm hypopyon. The lens was not clearly visualized. The anterior segment evaluation of the left eye was unremarkable. Corneal scrapings revealed the presence of fungal filaments in smears. The patient was started on 5% natamycin eyedrops every half hour, 1% atropine sulfate eyedrops three times daily, and 200 mg ketoconazole in tablet form twice daily. With medical treatment, the infiltrate density decreased, scarring was obvious, but a thick hypopyon measuring approximately 3 mm was seen despite 3 weeks of medical therapy (Fig. 3).

Therapeutic penetrating keratoplasty was planned. Culture of the corneal scrapings grew *Aspergillus* species. Anterior chamber paracentesis with washing of all exudates and intracameral injection of amphotericin B (5 µg) was performed. The procedure was performed in the operating room. Standard cleaning the eye with povidone iodine and application of Steri-drape were done. A limbal incision was made with a no. 11 surgical blade between the 10 and 11 o’clock positions. The anterior chamber exudates were expressed with a viscoelastic (hydroxypropyl methylcellulose). Saline irrigation was performed, but a thick exudate adhering to the anterior capsule of the lens was left because it was thought that removal of the exudate could damage the anterior capsule of the lens. The wound was closed with 10-0 monofilament nylon sutures. Intracameral amphotericin B (5 µg) was injected into the anterior chamber.

On the first postoperative day, there were exudates in the pupillary area with a hypopyon of about 1.5 mm. The patient was continued on the same preoperative medications, and 250 mg acetazolamide (half tablet) three times daily was added. The anterior chamber exudates and the hypopyon gradually decreased, and the infiltrate resolved. Three weeks after anterior chamber paracentesis the eye was quiet, there was corneal scarring, and the lens showed a cataract (Fig. 4). Visual acuity was counting fingers at 1 meter. Systemic ketoconazole was discontinued. Natamycin eyedrops were continued for about 6 weeks.

The patient underwent extracapsular cataract extraction with intraocular lens implantation in the right eye. The operative procedure was uncomplicated, and the postoperative period was uneventful. There was no exaggerated anterior chamber reaction. After 5 weeks of surgery, visual acuity was 20/70 in the right eye. There was corneal scarring and the eye was quiet.

**Case 3**

A 28-year-old man first presented to us on July 24, 1999 with blurring of vision in the right eye associated with redness and
watering of 3 weeks duration. This was after an injury with a thorn that was removed by the referring physician. On examination, he had visual acuity of 20/400 in the right eye that improved to 20/100 with pinhole, and in the left eye, it was 20/20. In the right eye, the lids were edematous. The conjunctiva showed diffuse congestion. The cornea showed scarring nasally to the pupil with a thick endothelial exudate. There was no obvious infiltrate in the cornea. There was diffuse stromal edema with epithelial edema. The anterior chamber was deep with 3+ flare and cells with a coagulum. The pupil was dilated; the lens appeared clear.

Anterior segment examination of the left eye was unremarkable. Fundus examination revealed hazy view in the right eye, and the left eye was normal. Ultrasound B-scan examination of the right eye revealed low echo reflectivity spikes suggestive of endophthalmitis, and the retina was attached. He was seen in our retina clinic, and medical therapy in the form of 0.3% ciprofloxacin hydrochloride eyedrops every hour, 5% natamycin eyedrops every half hour, 1% atropine sulfate eyedrops three times daily, 1% prednisolone acetate eyedrops four times daily, and 750 mg ciprofloxacin in tablet form twice daily was initiated.

He underwent pars plana vitrectomy, intraocular injection of antibiotics (1 mg vancomycin, 400 µg amikacin, and 5 µg amphotericin B), and anterior chamber tap under peribulbar anesthesia on 25 July 1999. The vitreous and anterior chamber taps were sterile even 1 week after incubation. Medical treatment was continued. The vitreous cleared, and anterior chamber reaction decreased.

About 2 weeks after surgery, visual acuity improved to 20/50. The frequency of 5% natamycin and 0.3% ciprofloxacin eyedrops was reduced to six times daily, and the steroid medication was continued four times daily. The endothelial exudates adhering to the back of the cornea increased in size, and hypopyon persisted even 2 months after surgery (Fig. 5).

On September 17, 1999, a retained intracameral foreign body, fungal infection, and cataract were suspected. Anterior chamber paracentesis was done with a supratemporal self-sealing scleral incision. The endothelial exudate was expressed by viscodissection. Part of the exudate was adhering to the iris, and therefore part of the nasal iris was excised. The exudate contained a wooden foreign body that was plated onto blood agar. The residual exudates were washed off, and intracameral injection of 5 µg amphotericin B was administered. On the first postoperative day, visual acuity was perception of light present with accurate projection of rays. There was diffuse stromal edema with epithelial edema. The anterior chamber was full of exudates with 0.5 mm of hypopyon. Treatment with 5% natamycin eyedrops every half hour, 1% atropine sulfate eyedrops three times daily, 200 mg ketoconazole in tablet form twice daily, and 250 mg acetazolamide (half tablet) three times daily was initiated.

Culture of the foreign body grew an unidentified hyaline fungus. The anterior chamber reaction and exudates subsided over 3 weeks when the lens formed a cataract (Fig. 6). Ultrasound B-scan examination revealed clear vitreous, and the retina was attached. Treatment with 5% natamycin eyedrops was reduced to eight times daily, and 1% prednisolone eyedrops four times daily were added.

The patient underwent extracapsular cataract extraction with intraocular lens implantation with peribulbar anesthesia on November 1, 1999. The operative procedure was uncomplicated. On the first postoperative day, the cornea was clear except for scarring, and the anterior chamber showed 1+ flare and 1+ cells (Fig. 7). The intraocular lens was in place. The patient was put on tapering doses of 1% prednisolone acetate eyedrops for 1 month. When seen on January 20, 2000, he had a visual acuity of 20/30 in the right eye. The eye was quiet. The intraocular lens was in place. The intraocular pressure was 13 mmHg. Fundus was within normal
Katz et al. reported a patient who had been intubated and treated with anterior chamber tap and from tissue obtained by corneal biopsy. Acanthamoeba was the causative organism, and K. pastoris silver stain showed multiple hyphae with branching at 45° of the mass through the limbal incision; Gomori methenamine silver stain confirmed the diagnosis. India ink and Gram smears and cultures were negative for microorganisms. Anterior chamber tap confirmed the diagnosis. India ink and Gram smears were positive for Cryptococcus neoformans. Results of an examination of the aqueous humor showed a quiet eye and the intraocular lens in place.

**DISCUSSION**

Anterior chamber paracentesis has been very useful in the diagnosis of infectious keratitis, particularly when the infiltrate is deep stromal or when the presentation is in the form of an endothelial plaque. Su et al. reported a case of keratonylosis caused by Cladosporium species that presented as recurrent, deep stromal infiltration and an endothelial plaque for 6 months after the original corneal foreign body injury. Repeat corneal scrapings for smears and cultures were negative for microorganisms. Anterior chamber paracentesis was tried, and endothelial aspiration obtained positive findings of Cladosporium infection. McClellan and Coster reported a case of keratitis that was unresponsive to medical therapy for 6 months. The causative organism was diagnosed as Acanthamoeba after it was grown from the aqueous sample of the anterior chamber tap and from tissue obtained by corneal biopsy. Katz et al. reported a patient who had been intubated and treated with corticosteroid therapy for status asthmaticus and in whom a mass developed later in the anterior chamber of the right eye. Because the anterior chamber mass enlarged despite treatment, a diagnostic anterior chamber paracentesis was performed in the right eye. Results of an examination of the aqueous humor showed polymorphonuclear leukocytes but no organisms. Bacterial and fungal cultures of the mass were negative. Twenty days after the anterior chamber mass was noted, the patient underwent removal of the mass through the limbal incision; Gomori’s methenamine silver stain showed multiple hyphae with branching at 45° angles, consistent with Aspergillus. Charles et al. described a unique case of intraocular cryptococcosis presenting as an iris inflammatory mass in a patient with acquired immunodeficiency syndrome. An anterior chamber tap confirmed the diagnosis. India ink and Gram stain preparation showed encapsulated yeast forms characteristic of Cryptococcus neoformans.

We believe that despite good results, this procedure did not gain much acceptance because of the isolated serious complications of infection reported after the procedure. Azzura-Blanco and Katz reported a case of infectious keratitis in the paracentesis tract performed during a guarded filtration procedure for advanced primary open-angle glaucoma. The surgery was performed under local anesthesia, and a plastic drape was used to cover the lashes. On postoperative day 4, severe intraocular inflammation with a fibrinous pupillary membrane was seen. On postoperative day 13, a posterior stromal abscess at the site of the paracentesis wound was observed in the right eye with an overlying epithelial defect. Diffuse corneal edema and an intense fibrinous reaction with hypopyon were also seen. Corneal scrapings from the stromal abscess grew S. aureus.

Joondeph and Joondeph reported a case of purulent anterior segment endophthalmitis following paracentesis for acute central retinal artery occlusion. Four days after the procedure, the patient developed a corneal ring abscess with hypopyon and fibrinoid iritis. Culture of the anterior chamber material resulted in heavy growth of β-hemolytic Streptococcus. The authors emphasized the need for performing this procedure under sterile conditions including sterilization of instruments, wearing of gloves and a mask by the surgeon, proper draping of the surgical field, and consideration of chemical preparation of the eye immediately prior to surgery. This procedure is not commonly performed to diagnose microbial keratitis because most cases of keratitis can be diagnosed by much less invasive and readily performed procedures such as corneal scraping or corneal biopsy.

We report three cases in which a surgical incision was placed at the limbus for evacuation of anterior chamber contents, which helped in the management of these cases. In all these cases, the procedure was performed in the operating room with all aseptic precautions taken. Routine cleaning with povidone iodine after thorough distilled water wash of the eye and application of Steri-drape were performed. In first case, the etiology of the infection was established by culturing the anterior chamber exudate. Initiation of proper therapy caused resolution of the infection. In case two, the infiltration persisted despite intensive antifungal therapy, and there was a thick hypopyon. This procedure was tried before considering therapeutic penetrating keratoplasty. After removal of exudates, intracameral amphotericin B was injected. In this case, the infiltrate and the anterior chamber reaction subsided, but the patient developed a cataract. This was probably because of the involvement of the anterior capsule of the lens by the infection. In case 3, the retained intracameral wooden foreign body persisted as an endothelial exudate. In this case, before anterior chamber paracentesis, empirical antibiotic and antifungal therapy was given along with a steroid, highlighting the fact that anterior chamber paracentesis should be considered early in these situations when specific therapy can be initiated and topical corticosteroid therapy can be avoided. The therapeutic tap performed helped in the removal of the foreign body and the culturing of it. Fungus was grown, and initiation of proper therapy helped in the resolution of the infection. In this patient, the cataract progressed after the tap and the patient did well after cataract surgery.

To conclude, we report three cases of ocular infections confined to the anterior segment in which anterior chamber tap was helpful in the management. This procedure should be performed under strict aseptic conditions. If the infection involves the anterior capsule of the lens, care should be taken to avoid injury to the lens, and the possibility of progression of the cataract should be explained to the patient.
REFERENCES