Controversy in Ophthalmology at the Beginning of the 20th Century

Opinions Voiced in the Archives, Especially on Cataract and Glaucoma

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Volumes of the Archives of Ophthalmology from the early years of the 20th century include original articles as well as reports of proceedings of important ophthalmologic conferences held in the United States, Great Britain, and on the European continent. Original articles often provided new information, but speakers at conferences frequently offered lucid opinions on topics relevant to practitioners that were not found elsewhere in journals from that era, and these reports give us a sense of their thinking, particularly about therapeutic practices and knowledge of cataract and glaucoma.


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CATARACT

Standard Surgical Technique

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anterior chamber using a glass syringe with an angular tip.) The only illumination used was sunlight focused on the eye by a handheld lens, so it is unlikely that Finlay could see the posterior capsule. The patient remained in bed for 3 to 4 days, and the hands were tied to the foot of the bed at night. Nearly all Finlay’s patients had mature, hypermature, or complicated cataracts. His operative complications included 24% vitreous loss (mainly in his earliest cases), a high rate. (In comparison, at the ophthalmic clinic in Helsinki, Finland, vitreous loss was only 1%. Finlay also described 17% iris prolapse (usually due to trauma after surgery), 2% endophthalmitis, and 3% loss of the eye from inflammation. He did not mention any retinal complications. Forty-three percent of the patients subsequently required discission or excision of the posterior capsule. The final visual acuity was 20/20 to 20/30 in 15% of patients, 20/40 to 20/50 in 35%, 20/70 to 20/100 in 27%, 20/200 in 8%, and less than 20/200 in 15%.

The Intracapsular Controversy

Extracapsular surgery in 1900 had a major flaw: if the cataract was not mature, cortical material could not be removed effectively. The incidence of secondary membranes was high, so that many affected individuals needed to undergo another operation. Some surgeons attempted to ripen the cataract by various methods before removing the cataract, using a preliminary iridectomy, needling, massage, or injection under the capsule of the lens. Major Henry Smith, MD (1859-1948), an Irish surgeon working in India, believed that he had a better solution in his method of extracting the lens within its capsule. When Hermann Knapp accepted Smith’s first article for publication, he said, “If Major Smith could perfect his operation for the extraction of the lens in its capsule he would render a greater service to humanity than that rendered by the great Daviel.” (Jacques Daviel, MD [1696-1762], had performed the first planned cataract extraction in 1747.) Smith was the most experienced cataract surgeon the world had ever known and had done 20,000 procedures by 1908. The advantages of the intracapsular procedure were that only 1 operation was necessary, the cataract did not need to be mature to be removed, inflammation was less common, and there was no posterior capsule to become opaque. However, it was a more difficult procedure than extracapsular surgery. In 1905, Smith reported on 2616 procedures during the previous year at his hospital at Jullundur, Punjab, India. He said the results were “first class” in more than 99% of cases, but he did not have long-term data since most patients disappeared into the countryside shortly after surgery. His vitreous loss rate was less than 7%. Arnold Knapp visited Smith in India to learn his technique and even performed cataract operations there. Of the 104 procedures he observed or performed, the complications included vitreous loss in 13 cases, iris prolapse in 17, suppuration in 2, and choroidal hemorrhage in 2.

Captain A.E.J. Lister (1871-1943) of the Indian Medical Service worked with Smith for a year and performed 576 operations using the Smith method. His rate of vitreous loss was 4.7%. Despite language barriers with the native population, he was able to test the vision of more than 250 of his and Smith’s patients and estimated that “the average vision obtained after this operation, provided the eye was healthy before operation, is 6/6.” Lister published a follow-up report of 95 patients who had undergone cataract extraction at least 1 year earlier without vitreous loss. No retinal detachment was found in any of the patients. Visual acuities were excellent and astigmatism was rarely more than 1 diopter.

However, an unsigned editorial in the British Medical Journal in 1905 concluded, “we fear it will be a long time before British surgeons will be persuaded to adopt this operation, which, though it gives such incomparable results in Major Smith’s hands, most people will still regard as extremely dangerous.”

Posterior Capsulotomy

No matter how surgeons incised the anterior capsule in extracapsular cataract operations, most of the anterior capsule remained within the eye, as did the posterior capsule. Early 20th-century surgeons knew that epithelial cells would proliferate quickly and cloud the posterior capsule, creating a secondary cataract. These opaque layers were far thicker than those typically encountered by cataract surgeons today. The chief danger in opening the opaque capsule was excessive traction on the iris and ciliary processes. A thin capsule could be cut relatively easily with a knife-needle, even though many knives were not particularly sharp by today’s standards. Thick membranes required more extensive surgery than use of a single knife or 2 blades simultaneously. P.A. Callan, MD (dates unknown), advised excision of the center of the opacity using iridotomy scissors to minimize traction or laceration. He warned against making the corneal incision too far posteriorly because that might cause the heel of the scissors to traumatize the iris.

Smith believed that needling an opaque posterior capsule was far more dangerous than ordinary cataract extraction. He advocated extraction of the capsule, not just a central incision, and stated that vitreous loss should not occur with extraction, but “There may be an escape of a bead of vitreous which is of no importance.”

Cataract Miscellanea

Robert H. Elliot, MD (1864-1936), the famous British ophthalmologist who spent most of his career in Madras, India, described 125 cases of couching (displacement of the lens into the vitreous) that he had seen and concluded that he could think of no situation in which couching would have been preferable to extraction. The failure rate with couching was 69%, including 52 cases of iridocyclitis, 17 cases of glaucoma, 13 cases of imperfect dislocation of the lens, and 2 detached retinas. Elliot also thought he had seen many eyes that were atrophic from couching, even though the individuals denied having undergone the procedure. On the other hand, a few French ophthalmologists believed that couching might...
have an occasional role. Hermens Truc, MD13 (1857-1929), reported 2 successes of his own and said couching is indicated in patients with delirium tremens and in patients for whom the standard operation on 1 eye had failed. Photinos Panas, MD (1832-1903), the professor of ophthalmology at the Paris medical school, believed that couching could be done in very elderly patients, and he had good results in 3 of them.13 Because extracapsular extraction was not effective if the cataract was not mature, ophthalmologists tried many methods to ripen the lens, including incising the anterior capsule, massage, iridectomy, paracentesis, and injection under the anterior capsule. Incising the anterior capsule was often effective but sometimes ripened only the anterior cortex. Some surgeons considered this approach dangerous because it incited inflammation and could raise the intraocular pressure markedly. Hermann Knapp concluded, “many operators, the present writer included, prefer the risks of removing an immature cataract to any ripening operation.”16

Hjalmar Schiotz, MD (1850-1929), recommended cleansing the lacrimal sac with an antiseptic solution prior to surgery. He epi-lated the lashes before surgery and bandaged the eye for several days after surgery, but other surgeons did not find these measures useful.17(p194) Emile Valude, MD (1852-1930), cleansed the conjunctiva with formalin before surgery.17(p195)

In 1884, Carl Koller, MD (1857-1944), made the landmark discovery that cocaine is an effective topical anesthetic agent in the eye. Soon afterward he began to inject it subconjunctivally for additional effect, and occasionally he would add pilocarpine to the cocaine.18 Ernst Fuchs, MD (1851-1930), injected cocaine mixed with adrenaline 1:1000.19 Hermann Knapp had injected cocaine retrobulbarly as early as 1884, but other surgeons encountered severe complications from deep injections of cocaine. Retrobulbar anesthesia did not become commonplace until the fourth decade of the 20th century.

Emil Gruening, MD20 (1841-1914), preferred a T-shaped anterior capsulotomy to the cut made superiorly by Knapp because he had observed that this reduced the need to open the posterior capsule later. Gruening’s approach was logical because Knapp’s method meant that the anterior and posterior capsules would be adherent and with little or no exposure to the aqueous. If the capsule was very thick centrally, Gruening would remove the lens with its capsule.

W.E. McKechnie, MB, ChB21(p203) (dates unknown), a surgeon in the Indian Medical Service, published some suggestions for preparation as a surgeon: “In cataract operations more than in any others it is desirable that the surgeon feel fit. If the surgeon feels ill, or tired, he should not operate for cataract that day.” McKechnie23(p24) wrote that if he had taken quinine to treat a fever, he would often have a fine tremor that might interfere with his performance. Although he knew of a prominent surgeon who operated best under the influence of alcohol (“Dutch courage”), he did not recommend that approach. Instead, his advice was, “A few drops of a dif-fusible drug such as ether taken in a wine-glass full of water may be tried; if this does not cure the stage fright a powerful remedy is a hypodermic injection of 0.008 gm of morphone.”

GLAUCOMA

At the beginning of the 20th century there was no consensus among ophthalmologists on the proper treatment of glaucoma. Many forms of glaucoma were recognized, including acute, chronic, inflammatory, hemorrhagic, and congenital, but the distinction between angle-closure and open-angle glaucoma was not made until nearly 40 years later, when Otto Barkan, MD22 (1887-1958), defined the difference based on his work with gonioscopy. Although pilocarpine and eserine (physostigmine) were available for medical therapy, most ophthalmologists considered them relatively useless.22 One of the more curious treatments recommended for glaucoma was that of Professor K.R. Wahlfors24 (1849-1929) of Helsinki, Finland, who injected strychnine.

In a symposium on glaucoma held in 1901, Charles Bull, MD (1844-1911), reported that there is “complete divergence of opinion as to the relative value of various methods of treatment”25(p56) of glaucoma and “the question of tension is the most difficult to settle.”25(p57) He believed that surgery should be done early in chronic simple glaucoma (primary open-angle glaucoma by 21st-century terminology). Charles Kipp, MD (1835-1911), advocated iridectomy to treat this disease. He described the poor results he had observed with medical therapy (miotics) and advised early surgery. David Webster, MD (dates unknown), discussed sclerotomy in glaucoma. His experience with anterior sclerotomy was disappointing, for it is “little more than a large paracentesis,”26(p98) but his one experience with posterior sclerotomy indicated that the procedure was promising.

William Mackenzie, MD (1791-1868), introduced posterior sclerotomy in 1830, and this procedure was used for many years. He penetrated the eye 5 to 6 mm posterior to the limbus with a blade aimed at the center of the eye and twisted it to allow vitreous to escape. Early in the 20th century, many ophthalmologists believed that if the pressure did not decrease after an iridectomy or if inflammation was increasing, a sclerotomy should be considered.26 In 1906, Arnold Knapp27(p115) published his views on posterior sclerotomy. He believed that the procedure was indicated in “primary acute glaucoma or chronic glaucoma where the eye is very hard and the anterior chamber so shallow as not to permit a satisfactory incision.” With the patient under general anesthesia, Knapp punctured the sclera temporally with a cataract knife and rotated the knife so that vitreous escaped. He did not state how far posteriorly he made the incision. The eye would soften and the anterior chamber would deepen so that he could make an iridectomy during the same course of anesthesia. Knapp27(p331) concluded, “Whether the operation in the favorable cases exerted any particularly beneficial action on the glaucomatous process, beyond permitting a thorough iridectomy to be done, is a question which cannot be answered.”
Thomas Jonnesco, MD (dates unknown), a surgeon from Bucharest, Roumania, reported favorable results by resecting the superior cervical ganglion in the radical treatment of glaucoma.\(^3\) In the discussion that followed, Panas opposed the procedure, saying the only certain result is a miotic pupil. Theodor Axenfeld, MD (1867-1930), said that sympathectomy might be tried if iridectomy failed. In 1901, spirited discussion of this procedure occurred at the Section of Ophthalmology of the New York Academy of Medicine. Some believed that the procedure was efficacious, while others described high morbidity and lack of long-term effect.\(^4\) Robert G. Loring, MD\(^5\) (1837-1888), reviewed the literature on cervical sympathectomy in glaucoma. He identified 150 cases but found no proof that sympathectomy was effective. In 1901, David Little, MD (1810-1902), described his series of 67 cases of iridectomy for primary chronic glaucoma.\(^1\) He stated that iridectomy was the only known cure for this disease and that it reduced tension permanently in most cases. The point was debated and respected individuals, such as William H. Wilder, MD (1860-1935), said he did not believe that anyone with chronic glaucoma ever benefited from iridectomy; rather, many were injured by the operation.\(^2\) Lieutenant Colonel Herbert Herbert\(^3\) (1865-1942) believed that successful filtration following iridectomy was due to a gap in the incision and not the opening made in the iris.

Considerable progress in the surgical treatment of glaucoma occurred early in the 20th century when several individuals developed filtering procedures. Using a conjunctival flap, Felix Lagrange, MD\(^4\) (1857-1928), excised a crescent-shaped segment from the corneal side of a limbal incision into the anterior chamber. Herbert\(^3\) created a wedge of scleral tissue in the incision that was cut off from its blood supply and allowed filtration, while Freelandergus, MD (1857-1932),\(^5\) and Robert H. Elliott, MD (1864-1936),\(^6\) were successful using trephines. All these procedures were remarkable steps on the path toward contemporary filtration procedures.

**REFRACTIVE SURGERY**

Several ophthalmologists reported good results in treating high myopia, generally 16 diopters or more, with clear lens extraction. William Horatio Bates, MD\(^7\) (1860-1931), the controversial ophthalmologist who is best known today for his popular book, *Sight Without Glasses*, reported good results. P.A. Callan, MD\(^8\) (1844-1932), recommended discussion followed by paracentesis as the safest method. In younger individuals, needling alone sometimes was sufficient. Because a large incision was not necessary, he noted, complications, particularly vitreous loss and retinal detachment, were less likely. W.E. Lambert, MD\(^9\) (dates unknown), advised needling followed a few days later by a linear extraction. A review of 338 eyes operated on for myopia at the University Eye Clinic in Leipsic (Leipzig), Germany, reported that discussion of the lens was followed by retinal detachment in 11% of eyes after extraction.\(^7\)

**RETINAL DETACHMENT**

Treatment of retinal detachment had a high failure rate at the beginning of the 20th century. The importance of closing the retinal break was not yet recognized and visualizing the peripheral retina was difficult. Jules Gonin, MD (1870-1935), described his early studies in the role of the vitreous in retinal detachment, but this preceded his description of the importance of the retinal break.\(^8\) Wilhelm Uhthoff, MD\(^9\) (1853-1927), outlined various forms of treatment. No method was established as effective, but many creative surgical techniques were tried, including retinal puncture to form a communication between the subretinal space and vitreous, scleral resection, scleral puncture in the region of the detachment, continuous drainage of subretinal fluid, electrolysis to resorb subretinal fluid and create choroidal inflammation, iridectomy, placement of irritants in the subconjunctival or subretinal spaces, scleral cauterization, and injection of animal vitreous.

**CORNEAL TRANSPLANTATION**

Modern corneal transplantation was in the early stages of development in the early years of the 20th century. The first full-thickness graft that remained clear was made by Eduard Zirm, MD, in 1906. In a report on experiments in keratoplasty, Fritz Salzer, MD (1867-1952), stated that it was impossible to transplant a cornea from a rabbit to a man successfully but that human-to-human grafts can be successful, especially if the donor is an infant.\(^1\) However, in 1909, Francis Valk, MD (1845-1919), reported on transplant of a rabbit cornea to a human who had a corneal ulcer. Although the visual result was “indifferent,” the eye was not lost.\(^2\)

These descriptions from issues of the *Archives* a century ago show that important steps were occurring that led to our current levels of understanding. Hopefully, a century from now ophthalmologists will be able to say the same about advances that were taking place at the beginning of the 21st century.

Submitted for Publication: March 13, 2010; final revision received May 25, 2010; accepted June 23, 2010.

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Financial Disclosure: None reported.

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