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Count Sir Luigi Preziosi and His Glaucoma Operation: The Development of Glaucoma Filtering
Surgery

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Abstract

Count Sir Luigi Preziosi (1888-1965) was a famous ophthalmologist from the island Republic of Malta. He received his ophthalmic training in Rome and the United Kingdom. He practiced in Malta for 45 years and was a Professor at the University of Malta. Like many other physicians in Malta, he was active in the politics and governance of his country, serving as president of the Senate ,president of the National Congress to draft a new constitution, and,

finally, as president of the National Assembly of Malta. His most important ophthalmologic contribution was the development of the thermal sclerostomy filtering operation for glaucoma, which he first described in 1924. He referred to this operation initially as electro-cautery puncture and later simply as Preziosi's operation. Many surgeons considered this procedure an advance over the other available filtering operations such as sclerectomy, iridencleisis, and trephination. The operation was then further developed by Harold G. Scheie of the University of Pennsylvania in 1958. Scheie referred to his procedure as peripheral iridectomy with scleral cautery, and was a standard filtering operation for glaucoma for many years until the development of trabeculectomy.

Key words

Glaucoma filtering operations Peripheral iridectomy with scleral cautery Preziosi, Luigi
Scheie, Harold G Thermal sclerostomy

The island Republic of Malta consists of an archipelago of small islands in the center of the Mediterranean Sea. Its long history goes back to about 3000BC. During the time when the events of this paper occur, it was a colony of the British Empire and controlled from London

Preziosi was born in Malta on July 29, 1888 and received his Bachelor of Science degree and Doctor of Medicine from the University of Malta in 1910, at age 22. He then went to Rome where he studied at an ophthalmic clinic, and then obtained the Diploma in Ophthalmology from the University of Oxford, England in 1920. He returned to Malta where he was soon appointed Professor of Ophthalmology at the University of Malta and ophthalmic surgeon at the Central Civic Hospital. He represented the faculty of medicine at the General Council of the University.

During World War I, he served as an officer in the Royal Army Medical Corps of the British army. During World War II, he was an ophthalmic surgeon and consultant for the British army. Like many Maltese physicians, he was active in the political life of his country. Preziosi was a member of the Nationalist Party and was elected to the Senate of the colony in 1927 and became the president of the Senate in 1932. He was elected president of the National Congress to draft a new constitution in 1944. After the end of World War II, when the National Assembly was convened in 1947 as a prelude to the granting of self government by the British, Preziosi was elected president of the Assembly. However, he retired from active political life in 1949 to devote his efforts to ophthalmology which he practiced actively until a few days prior to his death on July 30, 1965.

Luigi Preziosi was descended from a noble family long settled in Malta. The first Count Preziosi was from Corsica and was ennobled as a count by King Victor Amadeus of Sicily and Duke of Savoy in 1718 for meritorious service in naval warfare. Upon the death of his father, Preziosi inherited the title of 8th count of Preziosi. He was a member of the Committee of Privileges of the Maltese nobility and served as president of that body. In 1948, he was created a Knight Bachelor by King George VI of England, entitling him to the title of Sir. This was in recognition of both his medical contributions and his political and governmental service. In 1956 the Sovereign Military Order of Malta created him a knight of grace. He married Ludgarda Chapelle, Baroness of San Giovanni, in 1920. They had three children; both of their sons became ophthalmologists, and one grandson, the present 10th count, is also a practicing ophthalmologist. After his death, in his honor, the Republic of Malta erected a statue of him on the Independence Mall at the capital and a public square also named for him.

Early in his career, Preziosi was very interested in trachoma, a disease very prevalent in Malta, and he was one of the first to use oral sulfonamides in the treatment of this condition

when this drug was introduced in 1938. However, he attained his greatest recognition by devising a new type of external filtering operation for the treatment of glaucoma.

The origin of glaucoma filtration surgery begins with Albrecht von Graefe's observation that about 20% of eyes on which he had performed iridectomy for glaucoma developed a cystoid bleb or scar at the site of the incision. Since von Graefe believed that excision of the iris was responsible for the lowering of the intraocular pressure, rather than the filtering bleb, he felt such a scar was undesirable and noted that disadvantages such as irritation or infection could develop, and felt that such cystoid scars should be excised if thin or irritated.

It was Louis de Wecker who, initially in 1867, first suggested that incision of the sclera, rather than the excision of the iris, was the important element of glaucoma surgery, and that the formation of the filtering bleb was, in fact, the pressure lowering mechanism in von Graefe's operation. De Wecker's procedure consists of various types of sclerotomies in the region of the chamber angle without excision of scleral tissue under the conjunctiva. It was often combined with iridectomy or iridodialysis as well. This operation was initially not well received or commonly performed.

Since acute angle-closure glaucoma was easily identified and chronic open angle glaucoma was very hard to diagnose (especially before the invention of the quantitative tonometry), much discussion and disagreement arose comparing the indications for and usefulness of these two operations. With the development of early applanation tonometry by Maklakov in the late 19th century and indentation tonometry by Hjalmar Schiøtz in 1905, there was better understanding of chronic glaucoma and its treatment by external filtration surgery, giving rise to several variations of filtering surgery.

These operations could generally be divided into three groups. One was the operation of iridencleisis, popularized by the Norwegian Søren Holth in 1906. In this procedure, the iris

was deliberately incarcerated into the scleral incision which facilitated formation of the conjunctival bleb. Although initially popular, this procedure never achieved great success due to the induced astigmatism, pupil distortion, and general concern over leaving the iris exposed under the conjunctiva and the possible increase in sympathetic ophthalmia. The second procedure involved some type of excision of the anterior sclera in the region of the filtration angle. This was first suggested by the English ophthalmologist Herbert Herbert (of the eponymous pits in trachoma) and then further developed by the English ophthalmologist Robert Henry Elliott who created a filtering procedure with a scleral flap. The principle of excising anterior sclera was introduced by Pierre-Felix Lagrange in 1905; he called this procedure "sclerectoiridectomy" and involved resection of part of the anterior lip of a beveled scleral incision combined with iridectomy. The procedure was picked up by Holth who developed a punch to excise the anterior portion of the scleral incision, rather than using scissors as employed by Lagrange. His punch was later used to by Haas and Iliff perform a posterior lip sclerectomy which became a popular procedure. The third modification of this procedure was corneoscleral trephination when a circular trephine was applied at the anterior limbus to make a limbal sclerectomy under the conjunctival flap. First described in 1909, the originators of the procedure, Freeland Fergus of Scotland and Robert Elliott, proposed this was simpler to perform than a Lagrange procedure. The procedure of trephination generally became the most popular of all the ab externo filtering procedures during the first half of the twentieth century, followed by sclerectomy and then iridencleisis. Iridectomy was established as the preferred surgery for acute glaucoma, although its mechanism of action was not understood until Edward J. Curran described the concept of relative pupillary block in 1920. In filtering procedures for chronic glaucoma, it was now understood that the iridectomy served only to prevent prolapse of the iris into the incision.

The author specifically noted that dissecting the conjunctival flap with the cautery tip was quite easy and the results were as good as using sharp scissor dissection to form the flap. The author was surprised that the operation had not achieved great popularity and praised its simplicity, speed, and absence of serious complications. A favorable report in cases of hemorrhagic glaucoma was published in 1963. A report in 1978 noted a high incidence of cataract formation following surgery which was attributed to prolonged flat anterior chambers postoperatively, and noted that if a scleral flap was dissected to cover or guard the sclerostomy, fewer cases of flat anterior chamber were noted and that the results were equally good to those with full thickness sclerostomies.

Eventually, however, this operation was made much more practical and useful by modifications developed and published by Scheie in 1958.

Harold G. Scheie was an internationally known ophthalmologist and surgeon, scientist and teacher during the middle of the 20th century. He was born on March 24, 1909, in Brookings County, South Dakota. He received both his undergraduate and medical degrees from the University of Minnesota. He then moved to Philadelphia and began his professional association with the University of Pennsylvania where he remained for the rest of his life. He served both his internship and ophthalmic residency there and also obtained a doctorate of science degree in 1940. He was appointed an instructor in 1940, but when the United States entered World War II, served with other staff members of the medical school at the 20th General Hospital Unit of the Army Medical Corps in the China-Burma-India theater of war. Scheie treated many patients but his most was Admiral Lord Louis Mountbatten, the Supreme Allied Commander of the South-East Asia theatre of war, when he had an ocular injury from a tree branch while riding in his jeep. Scheie's success in saving Mountbatten's eye resulted in a life-long friendship between the two. Like this relationship, Scheie's service in the Army would

continue after the war since he continued to serve in the Army reserves until he retired in 1964 with the rank of brigadier general.

Returning to the University of Pennsylvania, he became a professor in 1953 and chairman of the Department in 1960. He began his private practice in 1946. He encouraged the University to merge with the Wills Eye Hospital, but the University decided against this. So Scheie began raising funds for an independent eye institute and founded the Scheie Eye Institute in 1972. His fund raising efforts met with enormous success and the Department of Ophthalmology moved to the Eye Institute. He retired from private practice in 1983 and devoted his efforts for further fundraising for the Institute.

He published extensively on many subjects in ophthalmology and his name is eponymously associated with two phenotypes of mucopolysaccharidosis I, the Hurler-Scheie syndrome, and a milder form, the Scheie syndrome. He was co-author, with Daniel Albert of "History of Ophthalmology at the University of Pennsylvania."

Scheie originally described his glaucoma procedure at the 1957 annual meeting of the American Academy of Ophthalmology and Otolaryngology. He then published two articles, one in the *American Journal of Ophthalmology* in 1958 and the second in the *Archives of Ophthalmology* in 1959. He developed the procedure after he noted several eyes, in which he had performed peripheral iridectomy alone, developed filtering blebs. The only variation in surgical technique was that in these cases he had used the battery powered cautery, developed by H. Rommel Hildreth of St. Louis, along the line of the surgical incision for purposes of hemostasis. He deduced that retraction of the wound edges had caused the incision to gape slightly and allow filtration. He had previously demonstrated in a prior report that scleral shrinkage following application of cautery was a well known fact. He acknowledged that his procedure evolved from that of Preziosi, and cited 4 of Preziosi' papers but emphasized

that his technique and rationale was different. Instead of entering the anterior chamber with the hot cautery, the incision was actually made with a scalpel and the cautery was applied only superficially to retract the scleral tissue to make the fistula. Thus, the cautery was not essential to making the sclero-corneal fistula, but served to cause the lips of the incision to retract and that the chamber was not entered with the cautery tip, in contrast with the Preziosi operation. He emphasized that the posterior edge of the incision should be cauterized more extensively than the anterior lip, and that peripheral iridectomy was an essential part of the procedure, rather than only an incidental part as described by Preziosi.

He stated the advantages were that it was simple to perform and technically no more difficult than a peripheral iridectomy alone. He felt that the filtering blebs following the procedure looked thicker and less liable to infection than the thinner blebs associated with corneoscleral trephination. He also pointed out that the change in the appearance of the iris following iridencleisis did not occur in his procedure. In his first paper, he reported a success rate of 78% in primary open-angle glaucoma, but some eyes had hypotony. In his total of 41 eyes with both open and narrow angle glaucoma, the success rate was 85%, but again some had hypotony. He noted a greater success in narrow angle glaucoma eyes than open angle glaucoma; he was unable to explain the difference, but presumably the iridectomy was effective in eliminating the narrow-angle component of the glaucoma. He recommended this procedure as particularly useful in eyes with narrow-angle glaucoma. The followup in his original series was limited to only 14 months. His second series had a total of 70 eyes with slightly longer follow-up. The success rate was 69%, hypotony occurred in 21%, and failure in 10%. One advantage of this procedure over the Preziosi operation was that it was unnecessary in many cases to introduce any instruments into the anterior chamber, unless the iris failed to prolapse into the incision and forceps had to be introduced into the chamber to pull the iris into the incision for the iridectomy. Scheie referred to his procedure as peripheral iridectomy with sclera

cautery. Later reports called the operation the Scheie procedure, the Preziosi-Scheie operation, or thermal sclerostomy.

This operation became the most widely used filtration procedure but like all full-thickness filtrations procedures was not completely satisfactory. The development of guarded sclerostomies under a scleral flap with microsurgical procedures led to the introduction of trabeculectomy by Cairns in 1968 and its modification by Watson in 1970. Since that time all the above mentioned full-thickness procedures have fallen into abeyance and trabeculectomy has become the procedure of choice. Although the initial concept of trabeculectomy was to direct the anterior chamber aqueous directly into the two open ends of Schlemm's canal without external filtration, it soon became clear that trabeculectomy actually lowered the the pressure by external filtration; however, the name has persisted in spite of this fact.

I have reviewed the history of the development of glaucoma filtration surgery, with emphasis on Luigi Preziosi whose name is not as well known as many of the other surgeons involved. At the present time, surgery for open angle glaucoma is developing rapidly with newer instrumentation and technology. The addition of microsurgery, releasable or adjustable sutures on the sclera flap, anti-fibrotics, and implantable tubes and various setons have extended and improved the results of glaucoma filtration surgery.

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