

HERMENEGILD ARRUGA I LIRÓ

ARRUGA EPONYMS

The eponyms

Arruga operation. A dacryocystectomy technique with a perforation of the bone using hollow cylindrical drills activated by a motor¹⁻³.

Arruga operation. Enucleation leaving a ring of sclera from the limbus to the equator^{2,3}.

Arruga operation. Reduction of the ocular cavity in retinal detachment via a suture that passes through the equatorial region^{3,4}.

Arruga forceps. Forceps for intraocular extraction of the cataract^{1,4}.



Hermenegild Arruga
i Liró (1886-1972)

Hermenegild Arruga i Liró (1886-1972)

Hermenegild Arruga i Liró was born in Barcelona on 15 March 1886. His father, Eduard Arruga, an ophthalmologist, worked with Manuel Menacho, who he had met while in the army in the Philippines⁵. Hermenegild went to high school in Barcelona and began to study medicine in 1902; he graduated in 1908. While he was in his second year, he began to frequent Manuel Menacho's consultation and thus began his apprenticeship in ophthalmology.

After graduating, he travelled around Europe for two years with a grant from Barcelona City Council. He visited Paris (where he completed internships at the Ophthalmology Clinic at the *Hôtel-Dieu* and the *Institut Pasteur*) and Berlin (where among other places, he visited the clinics of the professors van Graefe and Hirschberg)^{6,7}. Some years later he did an internship in Lausanne, where he met Gonin; Arruga became his favourite disciple and they established a firm friendship (Gonin called him "the general of the southern troops")⁶. Arruga became one of the foremost followers, and later modifiers, of Gonin technique for treating retinal detachment: "Before Gonin work was known, it was rare to achieve a cure for retinal detachment. Some authors estimated one in a hundred cures; others believed they had cured a higher percentage; still others claimed they had never seen a cure. The fact is that if anyone was ever cured, we do not know how or why", Arruga said⁸.

Upon returning to Barcelona, he introduced techniques as yet unknown in Spain, including the Wassermann reaction (an antibody test for syphilis) and the use of the ocular tonometer, which was at first highly controversial. He worked alongside his father, first in the ophthalmology consultation on Portaferri Street and later, from 1913 onward, on Aragó Street where there were some rooms for patients awaiting surgery⁵. He soon became renowned for his operating skills: "Arruga had



Hermenegild
Arruga (centre)
in the operating
theater

the innate gift of a simple and precise operating technique. Watching him while he operated, it seemed as if nothing could be easier than an eye operation. He handled the finest instruments with elegance and dexterity, with extraordinary ability”⁶.

In 1914, he married Teresa Forgas, the daughter of an industrialist from Begur, with whom he had three daughters and a son, Alfred, who also became an ophthalmologist. His wife died in 1940 in an automobile accident (Hermenegild was also in the vehicle). His link to Begur and the Costa Brava was therefore strong and his relationship with Josep Pla started there. During the 1926-1927 academic year, H. Arruga defended his doctoral thesis entitled *Una modificación sencilla y eficaz de la dacriocistorrinostomía* (A simple and effective modification of dacryocystorhinostomy) in Madrid. In 1929, at the XIII International

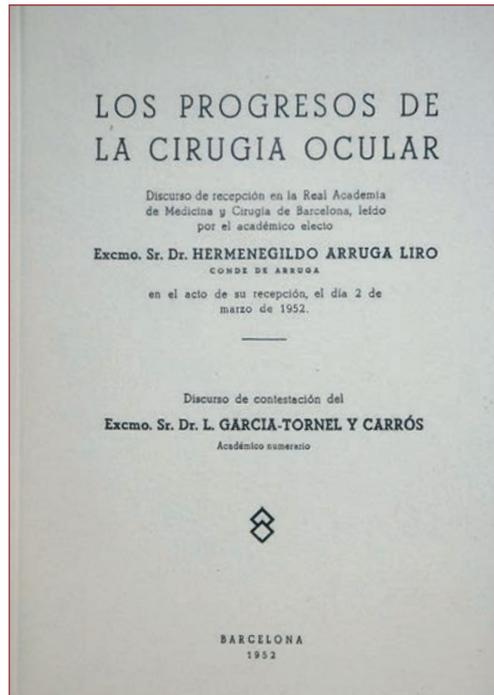
Ophthalmological Congress in Amsterdam, he presented his first results in the surgical treatment of 100 cases of retinal detachment (he had used Gonin techniques, which he had learned the year before in Lausanne)⁹. He achieved overwhelming success. From this time onwards, he often participated in international meetings. His contributions to the treatment of retinal detachment and cataract surgery were especially noteworthy⁵.

Contributions to ophthalmological surgery

In 1934, he first conducted what would later be known as the “Arruga operation”, dacryocystectomy in the absence of a lacrimal sac^{5,10}. That year, construction started on *Clínica Oftalmològica del Dr Arruga* in Barcelona⁵, his own clinic, which was equipped with cutting-edge technology for that time. The building consisted of a basement, ground floor, and three upper floors. The basement contained the equipment necessary to provide the building with modern heating, hot water, air conditioning, and softened water. The ground floor was devoted to consulting rooms. It also included two splendidly equipped refraction rooms, a darkroom (containing a Gullstrand ophthalmoscope, an ophthalmodynamometer, a refractometer, an astigmometer, and a slit lamp), three treatment rooms, an operating theatre (with a Zeiss “panphotos” lamp, a cinematography system for filming operations, and a system for sterilising surgical material using dry heat). The first floor was devoted to hospitalisation; the second contained the clinic’s staff rooms, while the fourth was the Arruga family residence¹¹.

During the Spanish Civil War, Arruga moved to Lausanne, where he undertook important scientific activity and participated in ophthalmological conferences. On his return to Spain in 1939, he published his first works on corneal transplantation. During the Second World War, he organised a food bank to help ophthalmologists from different countries around the world, distributing aid as food packages⁹.

Cover front of *Los progresos de la cirugía ocular* (Advances in ocular surgery), Arruga's talk when he entered the *Reial Acadèmia de Medicina de Barcelona*



In 1946, he published the first edition of his book, *Cirugía Ocular* (Ocular Surgery), which became a worldwide reference.

Arruga was renowned in ophthalmology. In 1950 he was awarded the Gonin Medal; this prestigious medal, considered "the Nobel prize in ophthalmology" is awarded every four years. In 1952, Arruga entered the *Reial Acadèmia de Medicina de Barcelona*, he gave a talk entitled *Los progresos de la cirugía ocular* (Advances in ocular surgery). He took part in numerous scientific events such as the Annual Meeting of the American Academy of Ophthalmology and Otorhinolaryngology in 1951, the International Congress of Ophthalmology –held in New York in 1954–, the congresses of the French and Irish societies in 1955, the Pan-American

Congress of Ophthalmology –held in Chile in 1956–, the International Congress of Ophthalmology –held in Brussels in 1958–, the Pan-American Congresses of Ophthalmology in 1960 and 1965, and so on⁵. He also received very many honours and distinctions: he was the president or honorary member in several academies and in over 30 ophthalmological societies worldwide; and he was named *Doctor honoris causa* in various universities. In 1950, the title of Count of Arruga was bestowed upon him^{5-7,12,13}. Hermenegild Arruga i Liró died in Barcelona on 17 May 1972; he had atherosclerosis¹⁴. He was buried in Begur, next to his wife. His death was felt keenly around the world. Evidence of this is the beginning of the obituary that the *British Journal of Ophthalmology* published in June 1972, a few days after his demise. It is worth reproducing the original text here¹³:

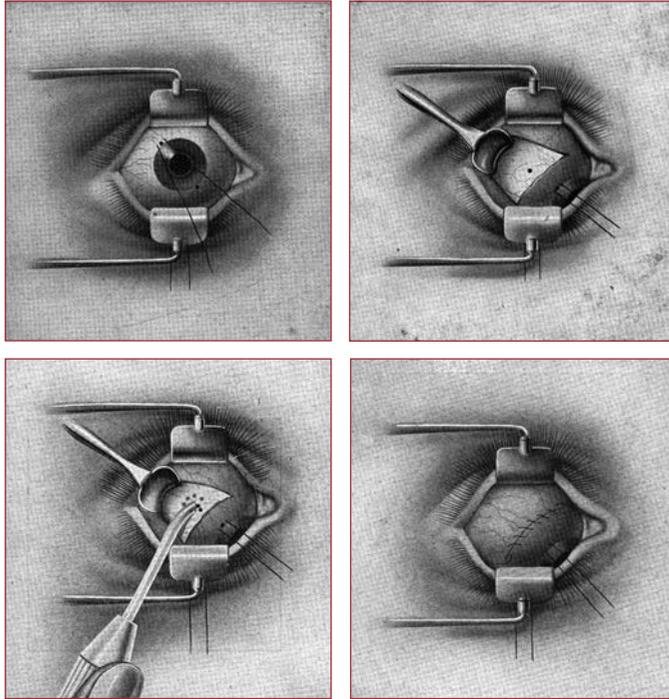
“A shadow has fallen over the whole ophthalmological world at the death of Hermenegildo Arruga on May 17th in his 87th year, one of the very greatest ophthalmologists of the previous generation. His skill in surgery was legendary, his ingenuity in devising new techniques unique, his writings were profuse and excellent, his capacity for living a full life in every sense and his appreciation of its joys were only exceeded by his ability to create lasting friendships and inspire the warmest reciprocal affection”.

He had published around 150 works¹⁰. The first publications, from 1909 to 1911, were related to laboratory techniques. From 1926 to 1951, he published 14 works on lachrymal pathology, the first of which was the result of his doctoral thesis. He published 31 articles on cataracts and their surgical treatment between 1928 and 1960. In cataract surgery, he was inclined to favour the intracapsular technique. Furthermore, he created or modified surgical instruments as required to carry it out, such as a hook for intracapsular extraction and a capsular forceps model that bears his name, “Arruga forceps”. He also published works on corneal transplant and keratoplasty. However, it is in the area of retinal

detachment where he was most prolific: 63 publications from 1929 to 1970. And it is in this area where his contributions were most significant^{14,15}. Arruga was the first to undertake and to improve Gonin technique outside Switzerland. He explained it himself in 1940⁸:

“I used the technique conceived by Gonin and perfected by other surgeons, based on the search for and localisation of the retinal tears existing in almost all cases of retinal detachment, and removing them via an operation consisting of production of an adhesive choroiditis in the area of the choroid around the retinal tear or tears, and in draining the subretinal liquid situated between the choroid and the retina, with one or several punctures perforating the sclera and choroid. The adhesive choroiditis is preferably obtained by applying diathermy to the sclera using a blunt electrode. The evacuative punctures to drain the subretinal liquid are also preferably made using a diathermic needle. [...] Favourable results have increased greatly with improvement of the technique, since this is a chapter of ocular surgery that is merely 12 years old. So we were overjoyed if we obtained cure rates of 20% to 26%, a figure that has been rising until today we have reached 75% [...] When dealing with simple cases –in other words, where there is little retinal detachment, or a small tear a few days old– the prognosis is so encouraging we achieve a cure in 95% of cases. [...] In large or multiple tears, the results are only favourable in 50% of cases”.

He also studied the general conditions linked to retinal detachment, the pathological conditions (general and ocular) that facilitate its appearance, and the clinical features related to the pathogeny of the detachment. He studied the features of the subretinal liquid and experimental production of retinal detachment (especially in rabbits) as well as modifications that the presence of a retinal detachment with tearing produces in the circulation of aqueous humour, etc. In 1957, during the XXXV Annual Assembly of the *Sociedad Española de*



Figures illustrating the surgical technique for treating retinal detachment employed by Arruga in 1940⁸

Oftalmología he delivered his paper: *Modalidades técnicas recientes de las operaciones del desprendimiento de retina* (Recent technical modalities of operations for retinal detachment), where he presented his cerclage technique⁵ (giving rise to another eponym, since it is also known as "Arruga operation"). His last work, *Experiencia de mil operaciones de cerclaje en el desprendimiento retiniano* (Experience of 1,000 cerclage operations for retinal detachment), was published in 1969 in the journal *Archivos de la Sociedad Española de Oftalmología*. His last conference, when he was designated *Doctor honoris causa* by the *Universitat de Barcelona* in 1970, also dealt with retinal detachment¹⁰.

Arruga was especially interested in advances in ocular surgery and he wrote several historical treatises on this subject, analysing both the progress of ophthalmological surgery itself, especially the treatment of retinal detachment, and advances in surgical ophthalmological material. He published several books, though none as important as the one cited above: *Ocular surgery*, which was very well received¹³:

“In 1946, this admirable treatise on ocular surgery appeared: it was accurate, simple, clear, illustrated with fabulous figures, often drawn by the author himself, revealing his artistic facet and concern for accuracy. [...] This treatise enables the trained oculist to venture into a new operation, even a difficult one, with a feeling of confidence and security for the patient”⁶.

The book went through four editions in Spanish, three in French, and two in English. In the fourth edition (1962), he invited his son Alfred to participate as the author of the chapter on strabismus.

Arruga and his contributions to ophthalmological surgical material

If Arruga’s contributions to surgical technique were momentous, so were his contributions to modifying or creating new apparatuses and instruments for use in ophthalmological operations. Streiff⁶ says:

“Arruga had the gift of knowing how to simplify the techniques and how to identify and produce the appropriate instruments. This craftsman, who created his own tools like the brilliant masters of the Middle Ages had done, studied his tools and their application down to the last detail until he achieved perfection. So many instruments and so many surgical techniques have been christened with Arruga’s illustrious name: the needle holder, separator, forceps,

dacryocystorhinostomy, cataract extraction, pterygium, cerclage in detachment, and others I cannot list here”.

The 1998 edition of *Stedman’s medical eponyms*⁴ included 11 Arruga eponyms referring to instruments and techniques: Arruga capsular forceps, Arruga eye expressor, Arruga eye implant, Arruga eye retractor, Arruga eye speculum, Arruga eye trephine, Arruga forceps (for intracapsular cataract extraction), Arruga globe retractor, Arruga keratoplasty, Arruga lacrimal trephine, Arruga needle holder, Arruga protector, and Arruga retinal detachment operation.

M. Pelayo, in his introduction to the *Encuesta acerca del tratamiento actual del desprendimiento de retina* (Survey on current treatment of retinal detachment) says⁸:

“He (*Arruga*) has contributed to bringing modern ophthalmological surgical techniques to the degree of perfection we have today. He has invented instruments, such as the forceps for intracapsular cataract extraction, the hook for expulsion of the opaque lens, a model of crowns for trephining the bone in a dacryocystorhinostomy, a blepharostat that exerts no pressure on the eye. And many others”.

Arruga’s contribution was so notable that he explained the process he followed to obtain some of his instruments at a conference presented in the *Secció Oftalmològica de l’Acadèmia de Ciències Mèdiques de Barcelona* in March 1942¹⁶. First he talked about his retinal detachment separator: “This separator is the result of two years of trials –Arruga explained–, even though it is an apparently simple instrument. I introduced variations in size, curvature, depth and shape of the edges [...] The model I offer to our colleagues can be used in the vast majority of cases.” He also presented trephines for dacryocystectomy, as well as new contributions to intracapsular cataract extraction, which he had been researching since 1932:



Arruga forceps (left) and
Arruga speculum (right)

“Recently I built a model for oculists who operate without using mydriatics to dilate the pupil, only the mydriasis produced by anaesthetic eye drops and retrobulbar block. This new model has a bevelled point so it can be easily positioned under the iris, and the upper edges, which are in contact with the rear face of the iris, are rounded so they do not pinch the iris when applying pressure to the capsule. [...] For cases of cataract –Arruga continued– I have conducted trials using many cupping glasses mounted on syringes and have managed to synthesise these experiences into the model I have built, consisting of many small pieces having no screws or rivets...”.

Other innovations were also present: “Additionally, I have had a device made to measure the traction power of cupping glasses and forceps. It is a string that carries a sort of rosary of wooden balls [...] At one end of the

string, there is a piece of metal with a 5 mm hole in which to place a lens that has just been extracted...”.

Probably, however, the best-known instrument bearing his name is the forceps, which constitutes a significant contribution to intracapsular cataract extraction: by 1957 over 30,000 sets of Arruga forceps had been manufactured.

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