

Chapter 2

The History of Ptosis Surgery

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Abstract From an inexact origin of trial and error, blepharoptosis surgery has become a scientific art. The arc of its technical development parallels that of anatomical discoveries and surgical materials. Approaches have varied, as have the tissues of interest, and with increasingly reliable results in the reconstructive domain came greater expectations and the development of its cosmetic counterpart. That said, for some diseases associated with blepharoptosis, an ideal surgery remains elusive. This chapter provides a chronological account of the treatment of blepharoptosis with attention paid to the tissues involved. The rich history of blepharoptosis surgery provides a fertile matrix for the field of oculofacial plastic surgery, and in return, the field continues to evolve blepharoptosis' surgical treatment.

The history and evolution of eyelid ptosis surgery can be analyzed in terms of chronology and tissue. A discussion of its chronology is inviting because this method allows for an understanding of the field's consecutive advances. One is able to appreciate the "who, what, when," and in some cases, the more complex questions of "why" and "how" of a particular technique and understand its ultimate favor or disfavor. In

a chronological discussion, one may see the subject matter's natural arch, which unfortunately, can be confusing at times. On the other hand, a discussion of the tissues involved in eyelid ptosis surgery allows for an artificially coherent history by abstracting the salient subject matter from its historical context and ignoring the tempo of evolution. Such abstraction dispossess the matter of elements potentially useful to those responsible for the next generation of surgical innovations.

Authors on the history of ptosis surgery tend to use one approach or the other. Beard used the tissue approach in his writing on the history of ptosis surgery [1, 2]. Servat and Mantilla and Thaller and Collin, as well as Julius Hirschberg, chose the chronological approach [3–5]. In this chapter, the latter approach is utilized with sensitivity paid to the tissues involved and the intention of providing the best attributes of both methods.

According to Rycroft and commonly cited in historical accounts of ptosis surgery, "ancient Arabian ophthalmologists" provide the first reference of eyelid surgery for the treatment of ptosis [1–3, 6]. In what amounted to a blepharoplasty, the "ancient Arabian" procedure involved resecting from the medial part of the upper lid an ellipse of skin that varied in size as a function of the amount of ptosis present. Others claim that about 100 ad, the encyclopedist of Greek and Roman surgery, Aulus Cornelius Celsus first documented the resection of eyelid skin for the treatment of ptosis in *De Re Medica* [7].

On the contrary, Hirschberg argues that neither did Celsus invent a blepharoplasty nor is

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there any mention of such a procedure in the Greek and Roman repertoire of surgery [5]. Instead Hirschberg credits C.F. von Graefe and Dzonzi with performing eyelid reconstruction in 1818 and Johann Karl Georg with the first monograph on blepharoplasty published in 1829 [5].

Regardless of its ancient origins, the history of ptosis surgery seems to unify with the 1806 publication of *Practical Observations on the Principle and Disease of the Eye* by the Italian anatomist and surgeon Antonio Scarpa. In this work, he describes a resection of “integuments at the upper part of the relaxed eyelid in the vicinity and direction of the superior arch of the orbit” that is intended to elevate the lid [1, 2, 6].

Henceforth, the wealth of publications allows for a logical narration with few opportunities for conflicting opinions. After 1806, ptosis surgery undergoes many revolutions as knowledge of anatomy and physiology progresses and as types of materials expand. At its core, however, Beard keenly notes that ptosis surgery essentially falls into one of six categories: skin resection, frontalis suspension, tarsus resection, levator resection, superior rectus muscle suspension, or a combination of the aforementioned categories [1]. With these facts in mind, the tour of the history of ptosis surgery continues.

In 1831, Hunt realizes that Scarpa’s procedure is in fact a frontalis suspension by virtue of its ability to tether eyelid to frontalis muscle by way of skin shortening [8]. The lifting effect is short-lived and the ptosis recurs, so alternative procedures are sought. A few years later, in 1855, though some sources suggest that it was not until 1882, A. von Graefe devises a technique in which a transcutaneous approach is used to excise approximately 10 mm of skin and orbicularis [3, 9]. The procedure seeks to weaken the protractors and consequently enhance the effective power of the retractors. Interest in this approach waxes and wanes with published reports until as recently as 2006 [10]. Two years after von Graefe’s report, and for the first time, Bowman targets the retractors [11]. Using an internal

and external approach, he resects both levator palpebrae superioris and tarsus.

Interest in the frontalis suspension technique is renewed with Dransart in 1880 as he uses buried catgut sutures to suspend the lid to the brow [12]. Dransart believes a scar serves as the true suspender once the suture is absorbed through inflammation. A year later, Pagenstecher places a temporary silk suture between the lid and the brow [13]. Hess also uses silk sutures, suspending the lid to the brow and removing them 3 weeks later [14]. Stepping away from the use of pure exogenous materials, De Wecker in the year 1882, uses a combination of skin, orbicularis and silk suture as a suspender, thus employing the first partial autogenous sling [4]. Pannus improves on the use of the skin sling and addresses the early and late infections associated with the procedure [2, 15]. Tansley in 1895 uses more differently shaped skin than that used by his predecessors, and Darier in 1897 uses orbicularis muscle as the brow suspension [4, 16].

A novel approach to ptosis surgery is devised in 1897 when Motais and Parinaud use the superior rectus muscle to provide lid elevation [17, 18]. Motais’ technique uses part of the actual muscle, while Parinaud uses part of the tendon, with both operations resulting in attachment of muscle or tendon to tarsus. Forty years later, Wheeler uses strips of orbicularis to attach the lid to the superior rectus muscle [19].

Although a new source of lid-lifting power, namely, the superior rectus muscle, had been identified, the lion’s share of attention, as evidenced by the number of publications, remains with the frontalis suspension. Koster used buried nonabsorbable sutures in 1899, Mules, a subcutaneous central gold wire in 1907, and Angelucci, levator to suspend the lid to the brow [4, 20, 21]. Payr’s implementation of thigh fascia in 1909 marks a significant advance in autologous slings [22]. Over the next 20 years, several variations of the above procedures are devised. Be it differently fashioned strips of skin or fascia, all techniques are dependent on the frontalis muscle for power [23–28].

The levator again becomes the tissue of interest as Everbusch describes a levator tuck operation performed via an external approach in 1883 [29]. In the same year, Snellen reports on having successfully treated ptosis with a levator tendon or aponeurosis resection [30]. Wolff in 1896 recommends isolating, mobilizing, and advancing the levator palpebrae superioris [31]. Blaskovics devises an internal approach with excision of the tarsal plate and levator in 1909, which he further develops with increasing attention to the lid crease in 1929 [32, 33].

The year prior to Blaskovics' lid crease technique, Kirby returns interest to the superior rectus muscle as a source of lid-lifting power and sparks a flurry of publications [27]. Calling the procedure a "modified Mouton operation," Kirby sutures the superior rectus tendon to the tarsus and combines it with a temporary frontalis sling. Seven years later, Trainor resects the superior edge of tarsus and, by the strip of resected tarsus' length, attaches the residual tarsus of the lid to the superior rectus tendon [34]. A year later, in 1936, Dickey uses fascia lata to link tarsus to the superior rectus tendon [35]. 1949 sees Berke reporting on a successful technique wherein he resects superior rectus muscle and, using the excised tendon, links the resected superior rectus muscle and eyelid [36].

Attention returns to the levator as Agaston reports on a refinement of the internal levator resection procedure in 1942 [37]. Ten years later, Berke modifies Blaskovics' original internal approach [38]. In the same year, Fox brings enthusiasm for the external approach to levator resection, an enthusiasm that is continued by Leahey in 1953, Johnson in 1954, and Berke in 1959 [39–42]. Around the same time, Iliff publishes on the virtues of the internal approach to levator resection [43]. Schimek reports that once the levator is resected it may be used as an autologous suspender in the same operation, thus providing both levator resection and frontalis sling [44].

In 1961, the conjunctival-tarsal-Müllerectomy, otherwise known as the Fasanella–Servat procedure, is published [46]. The simplicity and predictability of the procedure makes it attractive

and, according to some, helps bring ptosis surgery to a greater number of ophthalmologists and thus patients. Initially, it is thought of as a type of levator resection but is later understood to work in part, because of its resection of Müller's muscle. 1964 is remarkable in the history of ptosis surgery as an anatomist Jones suggests that the sympathetically innervated Müller's muscle could be employed in the treatment of mild ptosis [45]. He devises a surgery that advances the levator aponeurosis, but preserves Müller's muscle [45]. The technique is modified by Collins and Beard but does not gain popularity [1].

Rycroft continues to evolve the frontalis slings and recommends the use of extensor longus from the small toe as the suspender in 1962 [47]. In the subsequent 2 years, Yasuna describes a successful frontalis sling using cadaveric fascia lata as Iliff uses reconstituted collagen [6, 48]. Of note, Tillett and Tillett recommend the use of Number 40 silicone strips in lid-brow suspensions, and, near the same time, Bodian uses sclera as the suspender [49, 50].

Much development occurs during the 1960s and 1970s with new methods of lid elevation, and newer technologies. Although reported in the French and Argentinean literature, Guy and Ransohoff report on the use of a palpebral spring in the treatment of severe paralytic ptosis [51]. In 1967, Jones and Wilson report on the use of the corrugator supercilii muscle as a power source in the treatment of ptosis [52]. Mustarde describes a technically challenging surgery that tucks the levator to the roof of the orbit [53]. Singh and Singh utilize the power of the superior rectus by attaching it to the lid [54]. Conway describes a procedure in which magnets are implanted in the eyelid and applied to the rims of glasses as a means of elevation [55]. Sometime later, eyelid crutches are described [56].

1969 marks the next chapter in the history of ptosis surgery and is remarkable for the founding of the American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS). With its establishment, research in and publications on ptosis surgery flourish. Older procedures

are rediscovered; modifications are made, while materials are varied as anatomical knowledge increases.

In 1972, Putterman devises a clamp for a modified Fasanella–Servat procedure [57]. Putterman continues to improve his technique that resects Müller’s muscle and conjunctiva while sparing the tarsus [58]. Carbajal resects levator and Müller’s muscle through a combined internal and external approach [59]. In 1975, Lauring reports on the success of a sutureless Fasanella–Servat operation, and Bodian uses 5-0 nylon suture that is secured externally to avoid corneal irritation [60–62]. Weinstein uses a marking suture to more easily isolate Müller’s muscle and place the Putterman clamp [63]. Iliff uses a Fasanella-like approach but incorporates levator aponeurosis into the operative site [64]. Dortzbach recognizes the utility of phenylephrine as a means of preoperatively determining postoperative lid position of a Müller’s muscle resection [65]. Most recently, in 2008, Khooshabeh and associates describe an “open sky” surgery that isolates and resects Müller’s muscle while leaving conjunctiva largely intact, excepting the incision [66, 67].

The frontalis sling continues in popularity. During the 1970s, fascia lata slings undergo extensive investigation. Incisions are varied, postoperative adjustments made, and long-term results reported on their outcomes [68–70]. The frontalis silicone sling receives further attention, and its use continues to this day [71, 72]. In 1986, Anderson describes a procedure in which the needle is passed through the brow and then behind the septum on its course to the eyelid margin [73]. This results in a more natural-appearing lid crease and thus a more cosmetically acceptable appearance [73]. Goldberger in 1991 reports on the use of a double rhomboid silicone rod frontalis sling [74]. Downes uses a Mersilene mesh sling in ptosis repair [75]. Again varying the suspensory material, Sternberg successfully uses preserved placental umbilical vein as a sling [76]. Han transposes a frontalis muscle flap and attaches it to tarsus as a treatment of the ptotic lid [77]. Leibsohn rotates a periosteal

flap, and Ibrahim uses the levator muscle as the suspensory element [78, 79].

The anatomical studies of Jones, Quickert, Anderson, and the like, during the 1970s, usher in the age of levator palpebrae superioris aponeurosis surgery [45, 80, 81]. Although aponeurosis surgery has had been previously conceived, performed, and described at the end of the nineteenth century, unreliable results and more reliable alternatives diminished its popularity [29, 31]. With improved understanding of eyelid anatomy and physiology, interest in aponeurosis repair returns. In 1975, Jones et al. and Older report on aponeurosis repair, while Harris and Dortzbach report on levator muscle and aponeurosis tucking [80, 82, 83]. Fox notes that levator function and not the degree of ptosis should dictate the amount of repair [84]. Anderson, a great champion of aponeurosis repair surgery for the treatment of ptosis, reports extensively on its anatomy, its use in neuromyopathic, involutional, and milder cases of congenital ptosis, and deems the 1980s the Age of Aponeurotic Awareness [81, 85–88]. Variations are carried out during this period of enthusiasm that include the manner of aponeurotic repair, i.e., an A-frame repair versus a single suture or the size or location of the incision made by a variety of instruments – CO₂ laser versus surgical steel [89–92]. In 2001, Meltzer describes an external aponeurotic repair using a single 5-0 silk that may be adjusted by postoperative day 4 [93]. To this day, aponeurosis repair remains a popular approach to ptosis surgery.

All told, the history of ptosis surgery is a story of success and failure, of procedures invented, rejected, and forgotten, only to be rediscovered as surgical material, knowledge, and technique improve, making yesterday’s impossible today’s standard of care. As the understanding of eyelid anatomy and physiology increases and technologies employed in surgical repair advance, greater satisfaction by both the surgeon and patient may be achieved. One may be certain that though much progress has been made in the treatment of eyelid ptosis, much remains undiscovered and consequently, an enticing pursuit.

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