

HISTORY OF SURGICAL STRABISMUS TREATMENT

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Introduction

The history of surgical strabismus treatment is young, beginning only in the first half of the 19th century. This is surprising, considering that a squint is disfiguring and has for this reason always been regarded as a disease.

Treatment of strabismus was first mentioned in a collection of Egyptian prescriptions of 1500 B. C. (Papyrus EBERS) found in 1872 in Thebes. To cure the eye-turn, the brain of a tortoise and Abra-spice aa 0,0141 should be placed on the eye (EBERS 1889, quoted by HIRSCHBERG 1899).

In the works of the Corpus Hippocraticum of the pre-Alexandrian period (HIPPOCRATES, 460 – 377 B. C.), the „common” squint was regarded as an inherited disease, whereas sudden onset of a squint, such as in paresis of the ocular muscles, was connected with fever and nervous disease. This mainly theoretical, speculative way of thinking of the classic era was followed by the empiricists who, with their spirit of research, lead the scientific medicine of the Greeks to a summit. The last representative of these doctors, Claudius GALENUS of PERGAMON (123 – 199), was the first to describe the extraocular muscles (*De usu partium corporis humani*).

He maintains that a seventh muscle, the *musculus retractor bulbi*, is present in humans, as it is in animals. This misconception was corrected only 1500 years later. GALEN's ophthalmological writings were unfortunately lost so that only little of his diagnostic and therapeutic knowledge was passed on. He regarded squint — probably following the concepts of Hippocratic medicine — essentially as a defect of the ocular muscles. He distinguished *paralysis and spasm* of the different ocular muscles (with diplopia) from *congenital strabismus* (without diplopia). No reference is made to a surgical treatment of strabismus (HIRSCHBERG, 1899).

In the early Byzantine era, PAULUS of AEGINA (625 – 690) attempted a type of orthopaedic exercise:

„Deviations present in children as from birth are cured by placing a mask over the face in order to urge the little ones to look straight ahead, since the spasm of the muscles moving the eyeball is a squint” (HIRSCHBERG, 1899).

Arabic medicine, based on the knowledge of Greek medicine and particularly on the writings of GALEN, is not acquainted with strabismus surgery either. One also attempted to exercise the eyes by placing a black cloth over the non-squinting eye or by gymnastic motility training. (HIRSCHBERG, 1899).

Much later, the Frenchman Ambroise PARÉ (1510 – 1590) advocated exercises with hoods or masks (MÜNCHOW, 1973). In the first German textbook of Ophthalmology, George BARTISCH (*Augendienst*, 1583) suggests hoods for treating children with strabismus (fig. 1), while adults suffering from strabismus that was caused by diseases should be cured by *Purgation*.

A seventh ocular muscle is also found in BARTISCH's book — most probably taken over from the work of Andreas VESALIUS (1514 – 1564) „De humani corporis fabrica libri septem”. This error of the *retractor bulbi* in humans is finally corrected by Gabriele FALLOPIO (1523 – 1562) in 1564, who also gives a splendid description of the mechanics and innervation of the ocular muscles (MÜNCHOW, 1973).

Charles de SAINT-YVES (1667 – 1736) objects against the squint masks, maintaining that under these masks the squinting eye would remain in a deviated position. He is the first to recommend occlusion therapy, as we still employ it in amblyopia treatment today:

„for children, squint spectacles with two holes serve no purpose, . . . occasionally, the good eye should be covered completely so that the squinting eye is straightened” (HIRSCHBERG, 1911).

Several other and important facts are found in his book *Nouveau traité des maladies des yeux* (1722). While examining squints he finds disharmony in the movements of the rectus muscles:

„some maintain that the cause is a defect of the transparent cornea, some others of the lens; both err, it is a defect of the muscles” (HIRSCHBERG, 1911).

This is not a new conception, but from these facts SAINT YVES derives his therapeutic consequences.

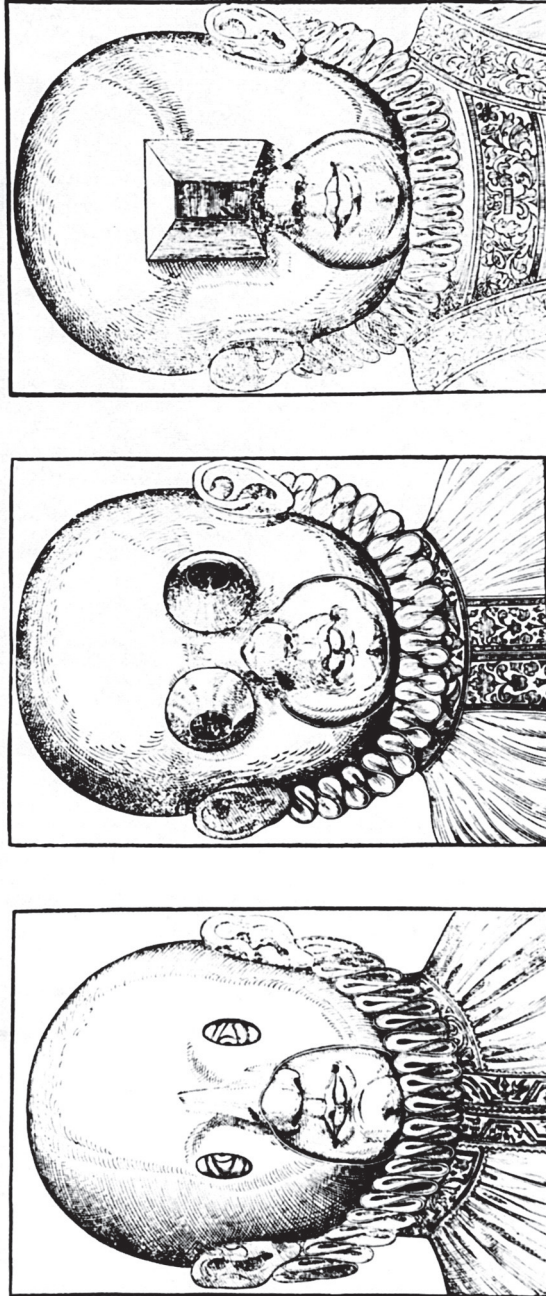


Fig. 1: Hoods that were used in the treatment of strabismus (reproduced from BARTISCH, 1583)



Fig. 2: The chevalier JOHN TAYLOR in a contemporary caricature (1770), performing an eye operation (enucleation?). Mark the embroidery on TAYLOR's coat, showing a row of eyes. The legend reads: „The Chevalier Taylor makes me cry” (Mi fa chiamare il Cav.^{te} di Taylor).

John Taylor

The earliest reference to surgical strabismus treatment is found in an „Avertissement” of the *Mercure de France* in 1737. It states that John TAYLOR, oculist of the King of Great Britain, has arrived in Paris, intends to stay several days and then will travel on to Spain. Squint surgery is advertized in the following words:

„Il nous prie de publier les decouvertes qu’il a fait de redresser les yeux des louches par une opération propre et presque sans douleur et sans crainte d’aucun accident” (LAQUEUR, 1908; MÜNCHOW, 1973) ¹

John TAYLOR was an extremely sparkling and shady personality. Magnificently attired, he and his followers travelled through all countries of Europe, even to Turkey and Persia.

After publishing suitable announcements, TAYLOR practised his art as an ophthalmologist in all major cities,

„becoming renowned through his rich knowledge and great skill . . . However, through his excessive self-praise, outrageous prives and desperate cures that failed, he loses his respectability, so that from 1750 onwards his name is hardly mentioned” (SCHRÖN, 1874).

Unlike the other traveling oculists, TAYLOR (Fig. 2) was scientifically active. The totality of his works cannot be judged. Some of them were lost or written in brief outlines, only, or even announced but never written.

In one of his books, which was translated from English into German in 1750, he precisely described the course and insertions of the ocular muscles („Augenmäuslein”) It can also be seen from other works by TAYLOR that he had an outstanding knowledge of the anatomy of the extraocular muscles and the pathophysiology of strabism. He undoubtedly regarded strabism as a disease and devised a method for its surgical treatment (SCHRÖN, 1874). His technique is described in a lecture by the surgeon LECAT (1700 – 1768) given in 1741:

„La grande opération, la plus merveilleuse de toutes, était celle par laquelle il prétendait redresser les yeux louches. En voici la manoeuvre: Avec une aiguille enfilée de soie, il prenait une portion de la conjunctive de l’oeil louche, vers la partie inférieure du globe, et, ayant fait une anse de cette soie, il s’en servait pour tirer à la soie la portion de la conjunctive qu’elle comprenait, et le coupait avec des ciseaux; ensuite il mettait un emplâtre sur l’oeil loche se redressait, et chacun criait miracle” (quoted by MÜNCHOW, 1973). ²

¹ „He asks us to publish the discoveries he has made with respect to readjusting the eyes of squinting persons by a suitable operation, almost without pain and without the risk of any accident” (author’s translation)

² „The great operation, the most marvellous of all, was one by which he pretended to readjust squinting eyes. The procedure is as follows: With a needle, to which a silk thread was attached, he took a portion of the conjunctiva of the squinting eye in the inferior region of the globe and, having formed a loop with the silk thread, he used it to pull the enclosed portion of the conjunctiva with the silk and then cut it with scissors. He then placed a bandage over the healthy eye, the squinting eye readjusted itself and everybody screamed: ‘What a miracle!’” (author’s translation)

TAYLOR himself stated that in order to recover ocular muscle balance, the stronger muscle should be weakened by severing the nerve subconjunctivally. It is questionable whether this was actually his surgical procedure or whether he simply removed a piece of conjunctiva and pretended to his medical colleagues that he had thus severed the nerve. In any case, this was certainly an insufficient procedure. By occluding the sound eye after the operation, so that the strabismic eye now appeared straight, an effective cure was simulated. However, when after several days the patch was removed and the squint became evident again, TAYLOR had already moved on.

Nevertheless, TAYLOR was certainly the first to advocate a surgical treatment of strabism as can be learned from the works of the surgeon ESCHENBACH:

„Es träumet wohl einmal einem oder anderen Okulisten, daß es möglich sei, denjenigen von den geraden Augenmuskeln des Augapfels, an dem die Schuld hauptsächlich liegt, ganz oder zum Teil quer überzuzerschneiden und durch solche Operationen das Schielen zu heben“ (ESCHENBACH, 1752).³

„Augenärzte haben sich eingebildet, das Schielen sei heilbar durch die Durchschneidung des einen oder anderen Augenmuskels. TAYLOR hat sie in Rostock nicht gemacht“ (ESCHENBACH, 1754).⁴

To which ophthalmologists, other than TAYLOR, ESCHENBACH refers, is unknown (SCHRÖN, 1874)

Whether or not TAYLOR actually put his idea of cutting the muscle into practice, has been discussed time and again. However, it seems highly unlikely, since he has not described this operation in any of his works, whereas he prides himself on all sorts of other operations. Thus, his ingenious idea of treating squint by cutting a muscle fell into oblivion for almost a century and, mainly because TAYLOR undermined his own reputation through his intrigues, he also brought disrepute upon his ideas.

Stromeyer and Dieffenbach

In his textbook *„Beiträge zur operativen Orthopädie oder Erfahrungen über die subkutane Durchschneidung verkürzter Muskeln und deren Sehnen“* (1838; Contributions to surgical orthopaedics or experience with subcutaneous cutting of shortened muscles and their tendons), the surgeon and orthopaedist Georg Friedrich Louis STROMEYER (1804 – 1876) advocated cutting the muscle of the strabismic eye:

³ „One or the other oculist may have dreamed at some time that it would be possible to transversely sever or incise that eye muscle of the globe which is the cause of squint and to cure strabism by such an operation.“ (author's translation)

⁴ Eye surgeons have imagined that a squint could be cured by severing one or the other eye muscle. TAYLOR has not performed such an operation in Rostock.“ (author's translation)

„Einen glänzenden Erfolg verspreche ich mir von Muskeldurchschneidung bei schielenden Augen, eine Operation, die für den geübten Augenarzt keine Schwierigkeiten haben kann. Nach Versuchen an Leichen würde ich bei Strabismus convergens spastischer Natur folgendes Verfahren empfehlen. Man läßt das gesunde Auge schließen und befiehlt dem Kranken das Auge soweit wie möglich zu abducieren. Man setzt alsdann einen feinen Doppelhaken in die Conjunctiva an der Gränze des Bulbus; diesen übergibt man einem geschickten Gehülften, der damit das Auge nach außen zieht. Alsdann hebt man die Conjunctiva mit einer Pincette auf und durchschneidet sie mit der Spitze eines Starmessers durch einen Vertikalschnitt, der die Orbita neben der inneren Seite des Bulbus eröffnet. Jetzt wird der Augapfel noch etwas weiter abducirt, wodurch der musculus rectus internus sogleich zum Vorschein kommt. Man schiebt eine feste Sonde unter und durchschneidet ihn mit einer gebogenen Schere oder mit dem selben Messer, womit man den Schnitt durch die Conjunctiva machte“.⁵

In the literature of that time, confusion exists regarding the date of the first strabismus operation on a living human being. This is because in 1875, STROMEYER still believed that the operation, advocated by him, was initially performed by FRIEDRICH PAULI (1804 – 1868). According to the accounts of contemporaries, however, PAULI only operated on corpses, but his attempts to operate on living persons failed. Thus, he had tried to operate a girl of 14 years, „*squinting with both eyes*“, who had agreed to an operation. Grasping the conjunctiva with a forceps, he failed to keep the eye in abduction and was unable to cut the muscle.

Johann Friedrich DIEFFENBACH (1792 – 1847) (Fig. 3) then actually performed the first strabismus operation on a seven year old boy on the 26th October, 1839.

On the 13th November, 1839, an account of this operation was given in the „*Medizinische Zeitung des Vereins für Heilkunde in Preußen*“:

„I. *Über die Heilung des angeborenen Schielens mittelst Durchschneidung des inneren geraden Augenmuskels.*

Eine von mir wegen Strabismus convergens unternommene Durchschneidung des inneren geraden Augenmuskels hat einen vollkommen günstigen Erfolg gehabt.

Herr Geh. Rat Jünken, welcher den von mir Operirten sah, war nicht wenig über den Erfolg dieser Operation erfreut. Der Schielende war ein Knabe von 7 Jahren. Das Auge war stark in den innern Augenwinkel hineingezogen und dadurch eine bedeutende Entstellung hervorgebracht. Die Operation machte ich auf folgende Weise: Der Kopf des Kindes war gegen die Brust eines Assistenten gelehnt; ein anderer Gehülfe zog mit einem Haken das obere Augenlid in die Höhe und mit einem zweiten Haken das untere Herab, so dass die Augenlidspalte stark erweitert war. Hierauf führ-

⁵ „I expect a splendid success from muscle severing in squinting eyes, an operation that cannot cause any difficulties for a skilled surgeon. After having experimented on corpses, I should like to suggest the following procedure in convergent strabism of spastic nature. One asks the patient to close the non-squinting eye and to abduct the other as much as possible. One then introduces a fine double clasp into the conjunctiva near the edge of the globe. The latter is passed on to a skilled assistant, who uses it to pull the eye laterally. Following this one grasps the conjunctiva with a forceps and cuts it vertically with the point of a cataract knife so that the orbit is opened near the inner aspect of the globe. Now, abduction of the globe is further increased, thereby exposing the internal rectus muscle. A solid probe is inserted below the muscle and the latter is cut with curved scissors or with the same knife that had been used to cut the conjunctiva.“ (author’s translation)

te ich einen dritten Haken durch die Conjunctiva im inneren Augenwinkel und in ziemlicher Tiefe durch das darunter liegende Zellgewebe; diesen Haken übergab ich einem dritten Gehülfen. Dann setzte ich ein feines Doppelhäkchen in die Sclerotica im innern Augenwinkel, welches ich mit der linken Hand hielt, und zog den Bulbus nach aussen hinüber. Hierauf incidirte ich die Conjunctiva dicht am Bulbus, wo sie sich in den innern Augenwinkel fortsetzt und präparirte, tiefer eindringend, das Zellgewebe vom Augapfel, worauf ich den Muskel mit einer feinen Augenscheere dicht am Bulbus durchschnitt. Letzterer fuhr, wie von einem elektrischen Schläge getroffen, plötzlich durch den äusseren geraden Augenmuskel angezogen, nach aussen, und stellte sich dann augenblicklich gerade, so dass in der Stellung beider Augen kein Unterschied mehr vorhanden war. Die Blutung bei der Operation war nur unbedeutend, indess beträchtlich genug, um bei derselben zu geniren. Die Nachbehandlung bestand in kalten Umschlägen; Entzündung des Augapfels stellte sich später nicht ein, und binnen acht Tagen war die Heilung vollendet. — Herrn Dr. Böhm statue ich meinen Dank für die große Sorgfalt, welche er dem Knaben nach der Operation erwies, ab.

STROMEYER, in seiner schönen Schrift über die subcutane Orthopädie, spricht sich nach den von ihm an Leichen angestellten Untersuchungen für die Möglichkeit der Durchschneidung des innern geraden Augenmuskels als Heilmittel beim Schielen aus; an Lebenden ist diese Operation aber bis jetzt noch nicht gemacht worden. Hoffentlich wird sie einen Platz in der Augenheilkunde einnehmen.”⁶

After DIEFFENBACH’s publication, a long and unpleasant dispute regarding the priority of this operation followed. CUNIER from Brussels claimed that GUE-RIN had already demonstrated strabismus operations on corpses since 1837 and that he had performed the operation on a living patient on the 29th October, 1839 — „two months before DIEFFENBACH”. CUNIER did obviously not know the exact date of DIEFFENBACH’s operation (26th October) and thus unintentionally confirmed DIEFFENBACH’s priority. In the *Annales d’Oculistique*, the journal that CUNIER had founded, DIEFFENBACH and CUNIER continued their inten-

⁶ „I. On the cure of congenital squint by severing the inner rectus muscle of the eye. — A severing of the inner rectus muscle of the eye, which I performed in convergent strabism, has brought about a completely favourable result. — Mr. Jüngken, Privy Councillor, who has seen the case operated by me, was quite pleased about the success of the operation. The squinting patient was a boy of 7 years. The eye was markedly displaced towards the inner lid angle and this resulted in a considerable disfiguration. The operation was performed in the following way: The head of the child was reclined to the breast of an assistant; another assistant pulled the upper eye lid upwards with a hook and the lower lid downwards with a second hook so that the lid aperture was considerably enlarged. After that I inserted a third hook through the conjunctiva of the inner angle and, in some depth, through the tissue below. This hook I passed on to a third assistant. I then placed into the sclerotic of the inner angle a fine double clasp, which I held in my left hand, and I pulled the globe laterally. After that I incised the conjunctiva near the globe, where it continues towards the inner angle, and I dissected, penetrating more deeply, the surrounding tissues from the globe. As if hit by an electric shock, the globe, pulled by the lateral rectus muscle, moved laterally at once and instantaneously straightened itself so that a difference in the position of both eyes no longer existed. Bleeding during the operation was insignificant, but sufficiently intense to be annoying. Postoperative care consisted in cooling bandages; an inflammation of the globe did not occur and within 8 days, healing was complete. I express my thanks to Dr. Böhm for the great care with which he treated the boy after the operation. — Stromeyer, in his beautiful paper on subcutaneous orthopedics, advocates in view of experiments that he conducted on corpses the possibility of cutting the inner rectus muscle as a means to cure squint. In living patients, such an operation, has not yet been performed. I hope that it will gain its place in ophthalmology!” (author’s translation)



Fig. 3: JOHANN FRIEDRICH DIEFFENBACH (1792 – 1847), the first eye surgeon who cut the inner rectus muscle in order to cure squint.



Fig. 4: ALBRECHT VON GRAEFE (1828 – 1870) performing an operation for squint.

se dispute, attacking each other and becoming abusive. Numerous other ophthalmologists regretfully declared that they had thought about and performed squint operations earlier but not published their procedures and results.

After careful investigations, the *Monthyon Prize* was then awarded by the Academy of Sciences in 1844 in Paris to STROMEYER for performing the first squint operation on a corpse and to DIEFFENBACH for performing the first operation on a living person.

As occurs so frequently with important scientific discoveries, time about 1840 was „ripe” for the strabismus operation and thus undoubtedly many surgeons, independent of each other, may have thought of surgery and possibly even performed the operation. Apart from the time factor, STROMEYER, can certainly be acknowledged as the discoverer of the strabismus operation, since he recognized the effect of surgery; and DIEFFENBACH can be regarded as the initiator since he realized its significance, improved the suggested method and, above all, continued to work and research in spite of some first failures.

Other Surgeons, Complications

DIEFFENBACH’s expectation that squint surgery would become accepted in the field of ophthalmology came true with an incredible rapidity. In 1842 he himself wrote:

„With rapidity almost unknown to science, with the speed of political information, news of the strabismus operation spreads over the entire civilized world and soon all public newspapers in Germany, France, America etc. are ringing with reports on hundreds of performed operations.”

Already by 1841, BONNET in Lyon reported about 300 squint operations, MARTINS in Rio de Janeiro about 82, CUNIER in Brussels about 800, CARRON DU VILLARDS about 700 and GUTHRIE in London about 340 (LAQUEUR, 1908).

In his major publication on squint operations, DIEFFENBACH wrote in 1842 that he had already performed over 1200 operations and that „*the success of these first operations was the greatest scientific satisfaction in my whole life*”.

With so many operations performed within such a short time span, failures were inevitable. From several publications and the available statistics, LAQUEUR (1980) estimated that in at least 25 to 30 percent the desired result was not achieved and that in a not negligible quota the condition was even aggravated. In numerous cases the operation that was meant to cure a convergent strabism resulted in a secondary divergent strabism (*Strabisme consécutif*). These patients with a divergent deviation were mockingly called the „Dieffenbachs”. DIEFFENBACH’s comment to these complications was: „*It is an occurrence highly compromising to the art*”. An impression of the cosmetic disfiguration that such an operation could cause,

can be gained from an illustration published by LANDOLT (1905). He had been able to photograph a female patient, who had been operated by the renowned ophthalmologist VELPEAU 60 years earlier, in 1841.

The cause of these failures was primarily the novel, unknown operation itself, secondly the blind ambition and wild enthusiasm of many ophthalmologists, who even cut several muscles during one session. In those days, the aim of the operation was, of course, solely to achieve cosmetic parallelism, whereas ocular motility was not taken into account. Finally, a third reason was an incomplete knowledge of the anatomy and physiology of the eye and its adnexa. Although careful examinations and descriptions of the human and animal ocular muscles existed (e. g. BELL, 1823), concepts of structure and function of the orbital apparatus were extremely fragmentary. According to recent examinations, they are still today (CÜPPERS and SCHUCHARD, 1965; KOORNEEF, 1977).

Failures and complications soon brought discredit upon squint surgery, so that after 1842 little was heard about these operations. In LANDOLT's (1905) bibliography, covering the period between 1843 and 1857, only 4 references to squint operations are given.

Albrecht von Graefe

Since the very beginning of strabismus surgery, many recommendations and much advice to prevent failures were given. ALBRECHT VON GRAEFE (1828 – 1870), the ingenious ophthalmologist, continued to work and research persistently in this field (Fig. 4). He finally succeeded to free the operation from its bad reputation and to give it a firm stand in the field of ophthalmic surgery. In a lecture, given in Berlin on 27th June, 1853, in front of the *Gesellschaft für wissenschaftliche Medizin* (Society for scientific medicine), he declared that the principle of the squint operation was correct, its performance, however, incorrect. The cause for this, he claimed, was mainly inadequate anatomical knowledge. He recommended a surgical technique preserving TENON's capsule and the muscle sheaths. He also devised more manageable and sufficiently small surgical instruments. Thus, through VON GRAEFE, surgery of the ocular muscles was revived a few years after its first discovery and rapid decline (cf. FLICK, 1982)

Summary

The history of surgical strabismus treatment is young. The earliest reference is from John Taylor, a british oculist, in 1737. He states that, in order to recover ocular muscle balance, the stronger muscle should be weakened. It seems highly unlikely that he did realize his idea.

In a textbook the German orthopaedist Stromeyer in 1838 advocates cutting the muscle of the strabismic eye. On 26th October, 1839, Dieffenbach in Berlin performs the first strabismus operation. Failures and complications soon bring discredit upon the strabismus operations. A. v. Graefe declares in 1853 that the principle of strabismus operation is correct but the performance is incorrect. Due to his research the operation finally receives wide spread recognition in the field of ophthalmic surgery.

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FLICK, H. — Die Geschichte der operativen Strabismusbehandlung

Zusammenfassung:

Die Geschichte der Schieloperation ist jung. Der früheste Hinweis stammt aus dem Jahre 1735 von John Taylor, einem britischen Okulisten. Er gibt an, daß man den stärkeren Muskel schwächen müsse, um das Augenmuskelgleichgewicht wieder herzustellen. Es erscheint höchst unwahrscheinlich, daß er seine Idee verwirklicht hat. Der deutsche Orthopäde Stromeyer empfiehlt in seinem Lehrbuch im Jahre 1838 die Durchtrennung eines Augenmuskels am schielenden Auge. Am 26. Oktober 1839 führt Dieffenbach in Berlin die erste Schieloperation durch. Mißerfolge und Komplikationen bringen die Strabismus-Operationen sehr bald in Mißkredit. A. v. Graefe erklärt 1853, daß das Prinzip der Schieloperation zwar richtig, aber die Durchführung unvollkommen sei. Durch seine Forschungen erhält die Operation einen festen Platz in der Ophthalmochirurgie.

FLICK, H. — L'histoire du traitement chirurgical du strabisme**Resumé**

L'histoire de la chirurgie du strabisme est récente, puisque la plus ancienne référence ne remonte qu' à 1735. Elle est due à John Taylor, ophtalmologiste Britannique. Celui-ci conseille d'affaiblir le muscle plus fort pour rétablir l'équilibre musculaire. Il paraît néanmoins peu probable qu'il ait réalisé son idée. En 1838, l'orthopédiste Allemand, Stromeyer recommande dans son livre la section d'un muscle de l'oeil strabique. Mais c'est en 1839 que Dieffenbach exécute la première opération de strabisme à Berlin. Les insuccès et les complications discréditent rapidement les opérations pour strabisme. En 1853, Von Graefe déclare que le principe de ces opérations est correct, mais que son exécution est imparfaite. Très rapidement néanmoins l'opération pour strabisme va occuper une place valable et importante en chirurgie ophtalmique.

FLICK, H. — Historia del tratamiento quirúrgico del estrabismo**Resumen**

La historia del tratamiento quirúrgico del estrabismo es joven. La primera referencia es de John Taylor, un oculista británico, en 1737. El estableció que para recobrar el balance del músculo ocular, el músculo más fuerte debería ser debilitado. Es muy poco probable que haya podido realizar esta idea. En un libro de texto el ortopedista alemán Stromeyer prona en 1838, el cortar los músculos del ojo estrábico. El 26 de Octubre de 1839 Dieffenbach realiza en Berlín la primera operación de estrabismo. Los fracasos y las complicaciones trajeron muy pronto su descrédito dentro de las operaciones de estrabismo. A.v. Graefe declara en 1853 que el principio de la operación de estrabismo es correcta pero sus performances no lo son. La operación se afianza en el campo de la oftalmo-cirugia gracias a sus investiagaciones.

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