Historical vignette

Dominique Anel: father of the hunterian ligation?

CHRIS A. SLOFFER, M.D., M.B.A., AND GIUSEPPE LANZINO, M.D.

Illinois Neurological Institute, Department of Neurosurgery, University of Illinois College of Medicine at Peoria, Illinois

On December 12, 1785, the famous British surgeon John Hunter ligated an artery that was feeding a popliteal aneurysm. During the procedure he ligated only the proximal side of the artery and left the aneurysm sac untouched. This is frequently viewed as a landmark event in the history of surgery. There is considerable evidence, however, that another surgeon, Dominique Anel, performed a substantially similar procedure more than 75 years earlier. It is possible that the weight Hunter’s name has borne in the history of surgery has led to the procedure’s bearing his name rather than that of the lesser known Anel.

KEY WORDS • John Hunter • Dominique Anel • popliteal aneurysm • history of medicine

Treatment of arterial aneurysms has been attempted since the third century, when Antyllus ligated an artery proximal and distal to an aneurysm, opened the aneurysm sac, and evacuated its contents.2 Surgical treatment of aneurysms varied little for the next 500 years. Throughout this period, the difficulties encountered when treating arterial aneurysms were numerous. There was always the risk of rupture. Ligatures were usually left protruding from the wound and were expelled in a delayed fashion along with necrotic tissue. This provided a second opportunity for a hemorrhage to occur. An attempt would then be made to check this secondary hemorrhage by tying a second ligature placed at the time of the initial surgery, the so-called ligature of reserve, or ligature d’attente. There was also the risk of gangrene in the affected limb from ischemia caused by the arrest of blood flow through the affected artery. Percival Pott, a contemporary of Hunter, favored amputation to treatment of the aneurysm itself. He wrote.

As far as my observation and experience go, such operation, however judiciously performed, will not be successful in that it will not save the patient’s life.11

Bradford Wilmer concurred.

With regard to aneurism of the popliteal artery, there is not . . . a single case upon record where that operation has succeed-ed.13

This pessimism was pervasive, and many patients perished or lost a limb to this disease.

John Hunter

John Hunter (Fig. 1) was born in Scotland on February 13, 1728, in the town of Long Calderwood, near Glasgow. The youngest of 10 children, he moved to London at the age of 20 years to work with his renowned brother, the anatomist William Hunter. John Hunter studied at St. Bartholomew’s Hospital under the direction of Percival Pott before moving to St. George’s Hospital, where he spent a 25-year tenure as both surgeon and anatomist. He also served as a surgeon in the British army during the Seven Years’ War. In 1776 he was appointed surgeon to King George III. In 1786 he became the deputy surgeon of the British army and in 1789 was appointed Surgeon General.

Hunter contributed to the disciplines of medicine and surgery in many areas. He produced important works on teeth, sexually transmitted diseases, inflammation, and digestion. His landmark volume, Treatise on the Blood, Inflammation, and Gun-shot Wounds, based on his observations during the Seven Years’ War, was published posthumously. Throughout his career Hunter accumulated more than 14,000 routine and abnormal anatomical specimens from his human patients as well as from many other species. After his death, this great collection was purchased by the Royal College of Surgeons, where it now constitutes the Hunterian Museum.

Hunter stands at the top of the pantheon of great surgeons. Along with Ambroise Paré and Joseph Lister, Hunter is widely considered one of the three greatest surgeons of all time. Hunter is credited with raising surgery from merely a technical trade to a profession based on science and observation. He was known to reject academic speculation in favor of experimentation. He summarized his feelings on experimentation when he wrote his student, Edward Jenner, on August 2, 1775, “I think your solution is just, but why think? Why not try the experiment?”
Hunter died on October 16, 1793, of apoplexy following an argument with his colleagues regarding the admission of students to St. George’s Hospital. He was initially buried after a modest funeral at St. Martin-in-the-Fields near Trafalgar Square. In 1859, however, his remains were removed to Westminster Abbey, where a plaque marking his burial site reads,

The Royal College of Surgeons of England have placed this tablet over the grave of Hunter, to record their admiration of his genius as a gifted interpreter of the Divine Power and Wisdom at work in the Laws of Organic Life, and their grateful veneration for his services to mankind as the Founder of Scientific Surgery.

Contrary to the life of John Hunter, very little is known of the details about Dominique Anel’s life. He was born in 1678 or 1679 in Toulouse, France. He studied surgery first in Toulouse and later in Montpellier. After serving for a short time in the French navy as a surgeon, he moved to Paris, where he studied surgery and anatomy under Jean Louis Petit and George Mareschal.

Anel’s practice of surgery took him from one place to another. He served as an army surgeon in Alsace. He was consulted on a case in Vienna, and spent time there before serving as a surgeon to the Austrian army. He studied in Mantua and spent several years in Rome.

In 1712 Anel went to Genoa, where he first performed surgery for a lachrymal fistula by using the syringe that now bears his name (Fig. 2). He treated the abbot Fieschi, a nephew of the Archbishop of Genoa, for his double lachrymal fistula. He also treated the mother of Amadeus II, King of Sardinia, for the same disease.

Anel returned to Paris circa 1716 and continued his surgical practice there for several years. Little is known of his later years, and the dates and places of his death and burial remain unknown.

The Operations

Dominique Anel was practicing in Rome in early 1710. On January 30 of that year, he cared for a clergyman who suffered from a brachial artery aneurysm. Anel described his method as follows,

With regard to the mode of doing the operation, I performed it in a different manner . . . for instead . . . of applying the ligature above and below the aneurysm, I only practised it above. Besides, the aneurismal sac is usually opened, but I did not touch it at all . . . that the sac, being once empty, would not refill.

The French surgeon Pierre-Joseph Desault performed surgery for an aneurysm on June 27, 1785. His method was similar and was documented by one of his students,

After proper preparation Desault operated. He made an incision 54 mm long over the upper end of the tumor, bared the artery, separated it from the nerve, and tied it.
John Hunter generally approached arterial aneurysms in the manner typical of his time. He described the traditional approach to his pupil, James Parkinson, as follows,

An incision must be made the whole length of the tumor; then an opening into the tumor, and the coagulated blood scooped or sponged out. The two orifices into the sac from the artery must now be found... Ligatures must be applied both above and below the tumor.10

Ultimately, Hunter decided to change the procedure. He chose to ligate only that portion of the artery that lay proximal to the aneurysm and placed the ligature at a distance from the proximal pole. As Hunter described it, he chose to "tie it up higher, in the sound parts."10 He went on to describe to Parkinson,

I have lately performed the operation at St. George’s in a manner different from the general practice. I laid the popliteal artery bare above and below the tumor, and took it up, leaving the tumor for nature to absorb, or to act with as she would.10

Hunter’s disciple and brother-in-law, Everard Home, described the new procedure, which took place for the first time on December 12, 1785, in more detail 1 year later:

He began the operation by making an incision on the fore and inner part of the thigh, rather than below its middle, which incision was continued obliquely across the lower edge of the sartorius muscle, and was made large to give room for the better performing of whatever might be necessary in the course of the operation: the fascia, which covers the artery, was then laid bare for about three inches in length, and the artery being plainly felt, a slight incision, about an inch long, was made through this fascia along the side of the vessel, and the fascia dissected off, by which means the artery was exposed. Having disengaged the artery from its lateral connexions by the knife, and from the parts behind it by means of the end of a thin spatula, a double ligature was passed behind it by means of an eyed probe, and the artery tied by both portions of the ligature.4

Home reported that the patient had a successful recovery and 6 months later, "was in every respect well." Unfortunately for the patient, but perhaps fortunately for surgeons to follow, the patient succumbed to a “remittent fever” 15 months after the operation. Hunter dissected the limb postmortem and preserved the specimen for his collection. It continues to be in the collection of the Royal College of Surgeons. The details of this autopsy were described by Home in a second publication.5

Discussion

As mentioned earlier, Hunter is known for transforming the practice of surgery and linking it forever to science. Many of his biographers have reported that Hunter devised his technique for treatment of arterial aneurysm by the following experimental method. Legend has it that, in July 1785, Hunter caught and tied a stag in Richmond Park. He then ligated one of the stag’s external carotid arteries. The antler on the ipsilateral side became cool to the touch. After 1 week’s time, however, the antler had regained normal temperature and was again growing. At necropsy the collateral vessels were found to be enlarged and were therefore deemed responsible for the rewarming and continued growth of the antler.

Although this story is attractive from a historical standpoint and would serve to demonstrate Hunter’s propensity for experimentation, it is unfortunate that there is no first-hand evidence that such an experiment actually happened.13,14 A junior contemporary of Hunter, for example, wrote,

It is to be regretted that Mr. Hunter himself did not favour the public with any account of this operation, or of the view he had of the animal economy which suggested it.3

The story apparently appeared for the first time many years later and is attributed to Professor Richard Owen, one of the conservators of the Hunterian Museum.4 The tale was also described by Sir William MacCormac in the Hunterian oration held in 1899.6

Word spread of the method Hunter used for ligation, and it became widely practiced. Some surgeons made modifications in an attempt to improve patient outcome. For example, attempts were made to exclude the vein from the ligation. Hanging ligatures and the ligature of reserve fell into disuse with the onset of the aseptic period. Surgical wisdom gradually began to acknowledge the benefits of the method of Anel, whereby the ligature was placed at the proximal pole of the aneurysm. Rudolph Matas, whose endoaneurysmorrhaphy procedure ultimately succeeded the death knell for Hunter’s procedure, described the relative advantages of Anel’s method:

Since the advent of the aseptic period, and the general adoption of modern methods of ligating arteries, the disadvantages of the Hunterian ligature have become more apparent, and the once almost forgotten method of Anel has come to take its place. The chief objections formerly raised against the ligation of the parent artery close to the sac have been removed, as far as the method of ligation is concerned, and its superiority over other ligatures in favoring the permanent obliteration of the sac, with much less danger to the collateral circulation, has made it preferable whenever the treatment of aneurisms by proximal ligation is indicated or adopted by the surgeon. . . .

Therefore it is evident that proximal ligation as near the sac as possible is to be regarded as the preferred method of ligation. Instead of ligating at Scarpa’s triangle or Hunter’s canal for popliteal aneurism, the ligation should be made in the popliteal space. Veneration for Hunter’s memory, its simplicity, and the traditional regard for authority, gave the Hunterian ligation the first rank, not only in preference to the Anel method, but to all methods of treating aneurisms, long after its relative inferiority as a method of treating aneurism had been established. It is only the indisputable evidence and success of other methods obtained since the aseptic period that has led to its very gradual and reluctant displacement in surgical esteem in English-speaking countries.7

During Matas’ time and still today surgeons venerate the memory of John Hunter. The ligation operation is lauded as only one of his many achievements. Despite the fact that Hunter’s operation took place more than 75 years after Anel’s procedure, and despite its ultimate displacement by the one described by Matas, Hunter’s operation continues to be hailed as a landmark event in the annals of medical and surgical history. Occlusion of the carotid and vertebrabasilar arteries (by either surgical or endovascular means) continues to be performed routinely as a therapeutic procedure for very large and difficult aneurysms, and this procedure is routinely referred to as “the hunterian ligation.” In contrast, Anel’s fame is largely limited to his advancements in ophthalmology. We agree with Matas that the history of medicine may occasionally adopt its eponyms based on the weight of the honoree’s reputation rather than on historical accuracy. According to our review of the literature on

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the subject, proximal arterial sacrifice to treat aneurysms should be more properly referred to as “Anel’s method.”

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Address reprint requests to: Giuseppe Lanzino, M.D., Department of Neurosurgery, University of Illinois College of Medicine at Peoria, 530 Northeast Glen Oak Avenue, Peoria, Illinois 61637. email: Lanzino@uic.edu.