

HISTORY OF DEVELOPMENT OF INSTRUMENTS TO MANAGE URETHRAL STRICTURES

Zahid Iqbal*

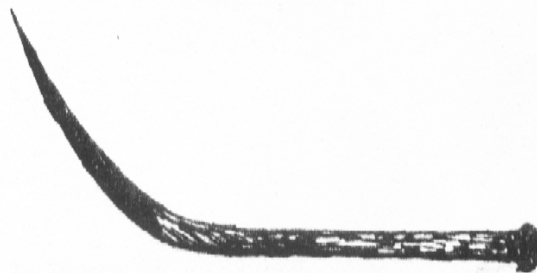
The history of the urethral stricture is a fascinating story spanning over three thousand years. It shows the continuous human struggle to overcome the problem of stricture urethra. It not only highlights the progress of medicine and application of modern technology but also its failure to offer a relative cure of this disease.

The earliest recorded attempts to treat urethral stricture dates back to the sixth century B.C., when metal and wood dilators were described in the Ayurved (Schmidt et al 1980). The procedure was little changed over the next 2,400 years. Dilatation was done with stalks of plants, feathers, papyrus rolls in Egypt, catheters of copper and bronze in Pompei, metal dilators and “explorers” of the Arabian surgeons. Candles, silk tissues leading finally to plastic catheters were used to dilate strictures in Algerian town called Bujyah. This town was famous for its honey and beeswax in the mediaeval times. The French named their dilators “bougies” and were followed by others. Americans refer to urethral dilators as “sounds” from the metal instrument used to detect bladder calculi by clicking against them before the days of x-rays. Today the words “bougie and sound” are interchangeable [1].

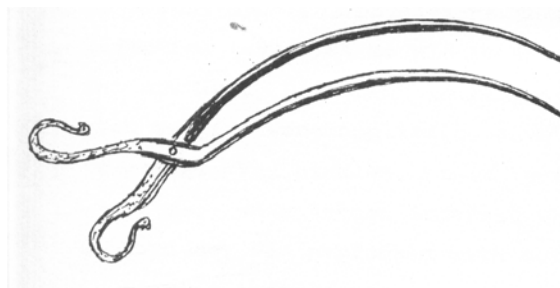
EARLIER HISTORY UPTO 1500 A.D.

We do not find any information about the incision of the urethra in the old well known historical scriptures of Hippocrates, Celsus or in those of the Alexandrian school which could be related to urethrotomy [2]. Hippocrates (5th century B.C.,) Roman period surgeons and Celsus (1st century A.D) all knew about cystotomy which was performed for retention of urine [3]. Sushutra an Indian surgeon who lived before Hippocrates performed perineal cystostomy to remove bladder calculi [4]. Aretacus (80 A.D) did perineal urethrotomy for the first time in the western world to remove calculi impacted in the urethra. Heliodoros in his book “Opera Chirurgica”

(90 A.D.,) described internal urethrotomy, where stricture was cut by means of pointed, sharp stiletto for the first time. In the following years stricture surgery was rarely discussed. Dilatation remained the main treatment. Rhazes (850 A.D.,) and Avicena (11th century) both knew of external urethrotomy for the relief of retention [5]. Cordovan Arab Surgeon Abi I-Qasim Khalf ibn Abass Al-Zahrawi (1180 A.D.) portrayed a catheter for the first time. He also advocated cutting new channel into the urethra in a case of innate atresia [2].



Al-Zahrawi's knife used for cutting new channel into the urethra 1180 A.D.

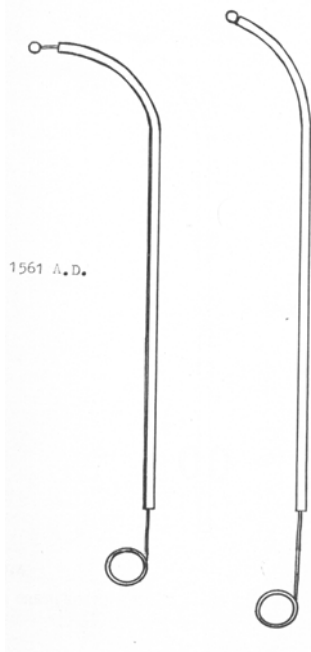


Marianus Sanctus's Instrument for forced dilatation 1550 A.D.

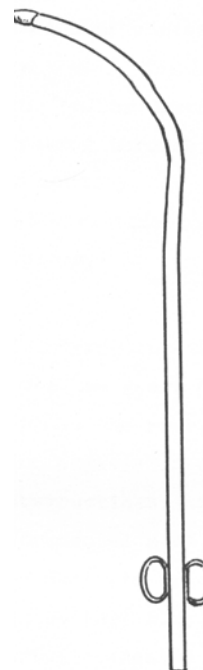
From 1500 upto 1800 A.D.

After the discovery of the new world in 1493 it is believed, Christopher Columbus (1451-1506), brought back syphilis apart from parrots and rare plants. The king and queen of Spain received him with highest honours. In the following years central and Western Europe saw epidemics of “lues” and gonorrhoea. In about 1550 A.D. physicians thought that venereal infection gave rise to ulcers in different parts of the urethra. Different astringent medicines along with bougies were applied to save the urethra from scarring. Wax candles, stalks and even forced dilatation was done. When needed internal urethrotomy and external urethrotomy was performed with cutting, piercing or lacerating instruments in a few cases. Marianus Sanctus 1550 A.D. advocated forced dilatation with his instrument. In 1561 A.D. famous French surgeon Pare practiced internal urethrotomy with cutting canula. The top was constructed like a file which moved back and forth in the wound. At the end of 16th century Diaz invented a similar instrument in Spain.

The first instance which can be regarded as authentic perineal urethrotomy performed for stricture was recorded by Richar Wiseman in 1652 A.D. Tolet, Colot and Solingen described the procedure in 1690 A.D. [5]. There was no progress in the following years.



Pare's Cutting canula 1561 A.D.



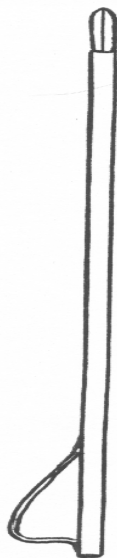
Diaz's Urethrotome (Spain 16th Century)

Great English anatomist and surgeon John Hunter (1728 – 1793 A.D.) applied silver nitrate to open the strictures in 1752 A.D. This was followed by dilatation. He performed perineal urethrotomy in 1783 A.D. at St. George Hospital, London. He also described the incidence of site of stricture for the first time [6]. The highest recorded incidence was in the bulbar urethra. He also warned of a violent breaking through with bougies. At the end of 18th century, in Paris Desault propagated forced catheterization and dilatation with new gum catheters.

FROM 1800 UPTO 1950

Instruments for blind internal urethrotomy were invented and improved over the years during the 19th century so as to replace the rude, imperfect methods of pushing in rods and stylets in order to puncture, drill or cut the obstructions. The earliest practical advance in the instrumental part of this mode of treatment was done by Hunter's friend and pupil Physic in 1795 A.D. [5]. He invented a new catheter, bearing concealed lancet which could be projected at will to cut the stricture. The first proper instrument was invented in 1807 by Charles Bell. This instrument had a blade on its moving top. The blade was in the form of an oblique quadrangle blunt in front and sharp

at the rear. Civiale (1827) of Necker Hospital, Paris invented a similar instrument, which became very popular among the surgeons in France.



Physick's Straight Urethrotome (1802)



Charles Bell's Urethrotome (1807)

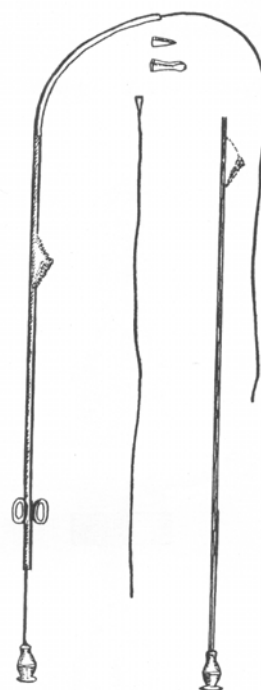
Caustics were widely used to treat strictures in 17th and early 18th century. The agents used were copper sulphate, caustic potassa, silver nitrate and other corrosive agents. Upto 1830 blind internal urethrotomy found more and more advocates while catheterization was abandoned.

Large variety of urethrotomes were constructed in the mid 18th century among which may

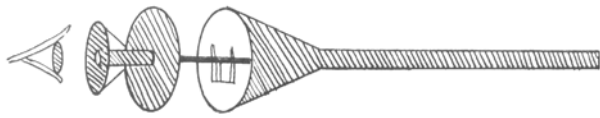
be named those of Reybert, Mercier, Maissonneuve, Gibson, Sidillot, Wood, Trelet, Thompson, Taveen, Ivanchich (Vienna) Ebermann (Russia), Bulhoes (Brasil), Pancoast, Otis, Mastin and Gross. Some of these urethrotomes divide the stricture from before backwards and others from behind forwards. The most common instruments in the second half of the century were those of Stafford, Ivanchich, Maissonnauve, and Otis.

The climax of blind internal urethrotomy was reached with Maissonneuve's urethrotome (1855). He first introduced a thin elastic bougie into the bladder, then a metal explorer with a channel was screwed into the bougies. While pushing forward the elastic bougies was rolled into the bladder. Finally the stricture was cut with a triangular knife, running in the channel.

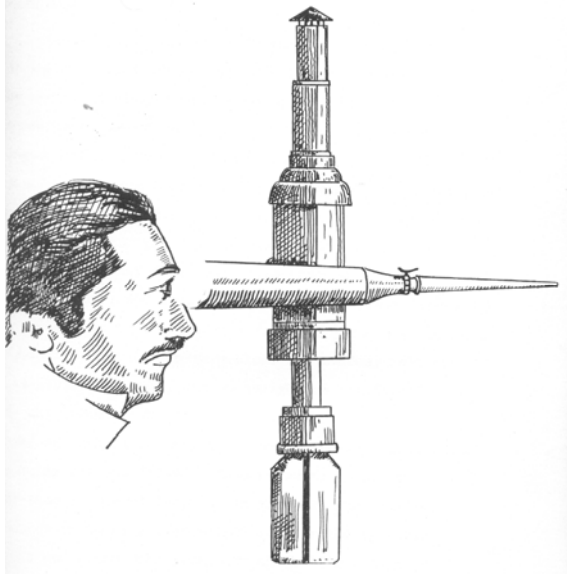
At the same time a new invention showed the possibility of substituting the blind internal urethrotomy with a visible one. Pierre Cigalas in 1826 was the first to see the face of stricture with his primitive cystoscope. In 1853 Desormeaux (Paris) did internal urethrotomy under Endoscopic control using a probe-pointed knife for the first time. He informed the "Societe de Chirurgie" of about 17 cases of urethrotomy in 1865. For a long time he remained the only one who used it



Maissonneuve Urethrotome



The cystoscope designed by Pierre Cigalas in 1826



Desormeaux endoscope

The practice of 'Rapid Dilatation' reached its climax in the last quarter of the 19th century. The recently introduced narcosis with chloroform supported that tendency. Thomas Wakely of London in 1850 dilated strictures by the passage of graduated tubes. Whalebone bougies were prepared with straight angular or spiral extremities for difficult strictures. A small catheter was first introduced into the bladder, and a metal guide screwed on to its end, and one by one the tubes of different sizes were passed. The most complete rod dilators for rapid dilatation were those of Thompson and Rigaud.



because of bad source of light and primitive optical system [7]. However, blind intervention remained the treatment in those days.

Gradually a new method "Divulsion" was spread for the so called irritable, resilient or elastic strictures. The word is derived from the Latin divollo, "I tear". It was practiced as early as 1835 by Perreve, a French surgeon and at a latter period by Professor Gross and other American surgeons. The original divulsor designed by Perreve consisted of two thin blades united together at one end. After passing the instrument through the stricture, rods of different sizes were pushed between the two blades, for wedging them apart. Perreve improved his instrument by connecting a filiform gum bougie to its extremity as a guide in very close strictures. Holt of Westminster Hospital, London designed a modification of this instrument. The end for the urethra was made olive shaped so that it may not tear the mucous membrane while the other end was fitted with a screw to regulate the separation of the blades. Billings constructed a similar divulsor in America [5]. After the operation quinine and opium were given during the first 24 hours to prevent "urethral fever".