Surgery for the Undescended Testis, History and Philosophy

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EDITORIAL

A lot of lessons can be learned by studying the evolution of surgical techniques and concepts used to treat a certain surgical entity over time. The eighteenth-century landmark anatomic descriptions of Baron Albrecht von Haller and John Hunter marked the start of the study of cryptorchidism. Hunter described the abdominal origin of fetal testicular development, he coined the term; musculus testis (the cremaster) and in 1762 he first used the term “gubernaculum” for the structure he believed was responsible for guiding testicular descent. Hunter studies were influenced by Baron von Haller’s observations [1].

John Hunter (1728-1793)

J.B. Curling of London defended Hunter’s original observations in 1840 in the Lancet.

Over the next century, the discussion of the nature of the gubernaculum, the role of the cremaster, and the process of descent continued [1].

In 1877, Thomas Annandale, a surgeon in Edinburgh, Scotland, reported the first successful orchiopexy, in 1893, Leonard Bidwell, in West London, described a technique for traction on the testis to gain around an inch and a half of length, and attaching the testis to an external wire cage to provide continuous traction [1].

Leonard Bidwell’s external wire cage technique [1]

In 1909, Franz Torek of New York, a surgeon known for the first successful esophageal resection via thoracotomy, published surgical technique for the treatment of the undescended testis. Torek, without knowledge of a similar operation described by C.B. Keetley in England, described a technique in which the testis was mobilized and fixed to the fascia of the thigh [2].

Torek proposed that the tunica albuginea is fixed to the fascia lata for three to six months. The testis was then detached. These traction techniques have been abandoned because the testicular vessels are very sensitive to excessive tension due to fixation to non-yielding anatomical structures and most of these cases have atrophied.

Bevan reported his results in 1918, in over 400 cases with an overall success rate of approximately 95% From Bevan’s work, important issues around the surgical treatment of the undescended testis became apparent: the need for mobilization of the cord to gain length, the possible necessity of division of the spermatic vessels to gain additional cord length, and the debate between traction and tension-free repositioning of the testis within the scrotum.

The Fowler-Stephens procedure, 1959 involves dividing the testicular vessels and mobilizing the testis in which vascularization will become dependent on collateral artery of the vas deferens. The main disadvantage is that during the second stage, the vas deferens and epididymis, as well as the testicular blood supply, might be injured due to adhesions. Moreover, a review by Docimo and many others, revealed the success rate of the 2-step Fowler-Stephens procedure to be around 77%. In the absence of long-term results on the fertility of patients who have undergone the Fowler-Stephens procedure [3]. Many studies have shown that interruption of the main testicular blood supply has deleterious effects on the microstructures of the sensitive testis parenchyma [4].

Robert J. Prentiss 1960, of San Diego, added additional concept with his detailed description of the surgical anatomy of the spermatic vessels. He has shown the anatomic evidence that lengthening of the spermatic cord could be achieved by division of the inferior epigastric vessels and medial displacement of the spermatic vessels. During the second stage, we used the Prentiss maneuver to bring the testis through a more medial new internal inguinal canal. The technique preserves the testicular vessels, achieves remarkable lengthening by gentle and gradual traction and is free from complications seen in other techniques. The validity of Shehata technique will be assured with long-term studies and with the comparison of fertility reports with other techniques.

Robert Prentiss’ anatomic triangles [5]

Once again, Prentiss emphasized the importance of repositioning the testis without tension to ensure good blood supply and prevention of further atrophy. The Prentiss principle is a direct course of the testicular vessels to allow direct passage to the scrotum instead of the longer and more angulated anatomical course. The price paid is the loss of obliquity of the inguinal canal [6].

A laparoscopic technique was first used to identify the location of a non-palpable testis in 1976 by Cortesi et al. and remained a diagnostic modality for many pediatric surgeons until the report of spermatic vessel clipping for a first-stage Fowler-Stephens operation by Bloom in 1991. Three years later, laparoscopic orchiopexy was first performed by Jordan and Winslow [3].

Concomitantly, Silber and Kelly 1975-1976 called attention to microvascular Anastomosis of testicular vessels, although the concept was to achieve tension-free placement in the scrotum and achieving very good vascularization of the testis, but has not been adopted by many surgeons for several reasons, including the long duration of the operation and the need for microsurgical skills and special instrumentation [7].

We published our technique and concept about the gradual lengthening of the testicular vessels to allow placement in the scrotum without tension while maintaining testicular vascularity (Shehata technique). The technique entails laparoscopic fixation of the testis with a single stitch to the abdominal wall a point one inch above and medial to the anterior superior iliac spine on the other side. After waiting period of 12 weeks, the fixation stitch is divided and the testis is brought to the scrotum [8,9].

Why this recent modification of the traction concept achieved high success compared to the older attempts at traction is because the fixation point is chosen to be on the abdominal wall rather than a fixed non-yielding point. When the testis cannot reach the traction point without tension, the soft abdominal wall indents inwards instead of exerting excessive tension on the vessels.

The mechanism of lengthening is possibly by the gentle and gradual pressure by the weight of the bowel over the testicular vessels across the 12 months waiting period. The presence inside the peritoneal cavity lined by serosal surface allovver prevents the adhesions known to occur when putting the testis in the subcutaneous tissues in some two-stage operations [8,9].

During the second stage, we used the Prentiss maneuver to bring the testis through a more medial new internal inguinal ring. The technique preserves the testicular vessels, achieves remarkable lengthening by gentle and gradual traction and is free from complications seen in other techniques. The validity of Shehata technique will be assured with long-term studies and with the comparison of fertility reports with other techniques.

REFERENCES