

Martius Flap Procedure to Repair Obstetric Fistulas

The Martius flap procedure is a surgical procedure used to treat obstetric fistulas in women. Heinrich Martius developed the procedure in twentieth century Germany to treat women with urinary incontinence caused by stress, and later doctors used it to repair obstetric fistulas. Fistulas occur in pregnant women when a hole is torn between the vagina and the urinary tract (called vesicovaginal) or the vagina and the rectum (called rectovaginal). The hole, or fistula, occurs in the tissue separating two organs and therefore obstetric fistulas result in either urinary or fecal incontinence. Fistulas can occur due to surgery, injury, or chemotherapy, but they most commonly occur in pregnant women who experience prolonged labor and do not have adequate access to obstetric care. As a result of the Martius flap procedure, patients regain functional use of their vaginas without continued urinary or fecal incontinence.

The Martius flap procedure supplemented the fistula repair surgery developed by James Marion Sims. Working in Montgomery, Alabama, Sims operated on black slave women between 1845 and 1849. He was the first doctor to repair vesicovaginal fistulas in women during the nineteenth century. In his method, he first used a speculum to open the vaginal canal and locate the fistula, and then he applied silver wire sutures to repair the fistula. In the 1920s, Heinrich Martius expanded on Sims's work while at the University of Göttingen in Göttingen, Germany.

Martius described his technique in the 1928 article "Die operative Wiederherstellung der vollkommen fehlenden Harnrohren und des Schliessmuskels derselben" (The surgical restoration of the completely missing urinary sphincter and urethra). He published two subsequent articles, one in 1932 and another in 1942. In his 1928 description of the technique, Martius described how to use the muscles which serve to constrict the vagina (bulbocavernosus muscles) to repair vesicovaginal fistulas. Later surgeons noted that Martius used the bulbocavernosus muscles to replace the injured urethral or rectal muscle.

The bulbocavernosus muscle in women is divided into two symmetrical halves that connect at the clitoris and extend to the central tendon of the perineum in front of the anus. Martius repaired the vesicovaginal fistulas by removing a flap of muscular vaginal tissue and a section of fatty tissue through an incision in the vaginal wall. He then inserted the tissues into the injured regions of the vaginal wall and bladder. The application of the flap using tissue from the female's own body helps ensure that her body will not reject the repair. The Martius flap procedure uses the fatty tissue as insulation between the vaginal wall and the urinary tract, and the tissue helps with healing.

Wilfred Shaw, in London, took Martius's description of the technique and applied it to the treatment of vesicovaginal fistulas and urinary continence in women. In 1949, he published seven case studies describing results after he had used the Martius flap procedure and other procedures on women. In his publication, Shaw describes the uses of the Martius technique, as described by Martius, and then elaborates on his alternative method to use. Shaw describes how tissue extracted from the exterior of the vagina, or labia major, worked better than the bulbocavernosus muscle because the tissue of the labia major lifted the urethra and the neck of the bladder. The fatty tissue harvested from the vagina could also be used to prevent urine leakage and strengthen the space between the sutured bladder and the anterior vaginal wall. Shaw operated on women afflicted with vesicovaginal fistulas and on women suffering from stress-induced incontinence. He concluded that his modified Martius flap technique was best used for the treatment of vesicovaginal fistulas and not for incontinence.

Some medical professionals have called the procedure a graft, though others claim that it is not a graft due to the type of tissue used. Shahram Ghotb Sajjadi, Örs Péter Hortváth, and Katalin Kalmár, working in Dubai, United Arab Emirates, describe how the procedure works and what material is

used for the flap in their 2012 article. According to these authors, the flap may contain skin, fat, or muscle from the labia majora region. Anatomically, there is a distinction between fatty tissue from the labia majora and muscle tissue from the bulbocavernosus muscle, and most fistula surgeries use only the fatty tissue. Also, the distinction between a graft and a flap is that a graft has no blood supply of its own. Whereas a flap has an integral vascular network and brings its own blood supply with it.

Doctors have used the Martius flap procedure to improve success rates in repeated fistula operations when the first operation was not successful. John Chassar Moir in England and Catherine Hamlin in Ethiopia used the Martius flap procedure in the twentieth century with vesicovaginal fistulas to reinforce earlier repair surgeries. By doing so, they showed that better results are attained when the technique is used as a supplement to simple repair surgeries, such as suturing. In Hamlin's biography, *A Hospital by the River*, she credits the work of Heinrich Martius as instrumental to her life's work with fistula treatments in Ethiopia.

In most cases, the procedure causes no disfigurement to the donor site, and surgeons continue to improve the rate of successful recovery. The Martius flap procedure has also been used in other surgical applications in diseases not specifically related to obstetric fistulas. At the turn of the twentieth century, the annual reported incidence of vesicovaginal fistula was sometimes as high as 500,000 cases worldwide, with a majority of these occurring after obstructed deliveries. Obstetric fistulas of the vesicovaginal variety were most prevalent in developing countries that lacked access to prenatal and antenatal care. The Martius flap was not necessary for fistula repair surgery, but as an addition to typical surgical procedures, it helped keep fistulas closed, diminishing the probability of urinary, or fecal, incontinence.

Sources

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