

SUCCESSFUL AUTOTRANSPLANTATION OF AN INTRA-ABDOMINAL TESTIS TO THE SCROTUM BY MICROVASCULAR TECHNIQUE

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ABSTRACT

An intra-abdominal testis in a child with prune belly syndrome was successfully transplanted to the scrotum by a microvascular technique. Immediate results were good with no palpable atrophy of the testis. Long-term results (fertility) will not be known for many years. The technique of microvascular anastomosis and its application to orchiopexy are described.

The use of the operating microscope recently has made possible anastomosis of blood vessels as small as 1/3 mm. in diameter.^{1,2} Microvascular surgical techniques originated in laboratories engaged in organ transplantation on rats.³⁻⁵ However, these techniques have numerous clinical applications, including reimplantation of digits,⁶ distant transfer of detached free skin flaps,^{7,8} reversal of vasectomy and bench repair of renal vascular lesions. We have now used the microvascular approach for orchiopexy in a child with prune belly syndrome.

One to 5 per cent of cryptorchid testes are intra-abdominal and cannot be properly brought down into the scrotum by conventional methods. In such cases necessary division of the spermatic vessels results in risk of testicular ischemia. We attempted to solve this problem by microanastomosis of the spermatic vessels to the inferior epigastric vessels in the groin.

MICROVASCULAR ANASTOMOSIS

The basic method of microsurgical anastomosis is depicted in figure 1. For small vessels 10-zero nylon suture is needed and the BV-2 needle is ideal. Interrupted suturing is necessary since the continuous suture technique used in macrovascular operations is too imprecise for vessels less than 1 mm. in diameter. In addition, a certain amount of purse-string cinching, which in larger vessels has hardly any noticeable effect, narrows the lumen of these small vessels considerably. The first 2 anterior row sutures are placed 120 degrees apart so that the posterior vessel walls are allowed to fall away. Once the anterior row is completed the vessel is rotated 180 degrees and the posterior row is sutured.

When operating on delicate, tissue paper thin veins whose walls tend to collapse, the surgical area should be flooded periodically with saline solution. This underwater suturing technique helps keep the ends of the veins open for an easier anastomosis. The various stages of the procedure are demonstrated in figure 2.

For the anastomosis itself the microscope should be used at magnification 24 to 36 with maximum illumination. Prior dissection and clearing of the vessels can be done under magnification 6 to 16. The instruments required include a No. 3 jeweler's forceps for clearing large vessels (more than 1.5 mm. in diameter) and Nos. 4 and 5 forceps for finer vessels. We have used Scoville-Lewis neurosurgical clips as non-damaging microvascular clamps (fig. 3).

ORCHIOPEXY: CASE REPORT AND MICROTCHNIQUE

A boy with prune belly syndrome had received satisfactory conservative treatment for hydroureteronephrosis until he was 9 years old. At that time we elected to attempt to move the testes into the scrotum despite their high intra-abdominal

position just below the kidneys (fig. 4). The spermatic vessels were detached and anastomosed to groin vessels under the microscope. Since the spermatic vein may be larger than the superficial or deep inferior epigastric vein, it may be necessary

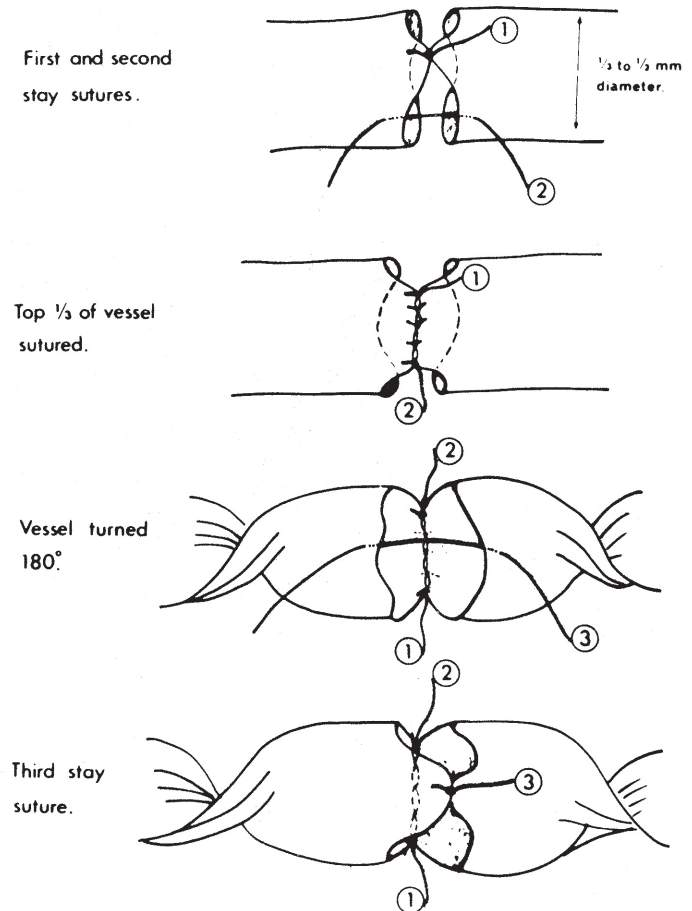


FIG. 1. Vessels less than 1 mm. in diameter require interrupted sutures of 10-zero nylon. Initial anterior row stay sutures should be 120 degrees apart rather than 180 degrees to allow back wall to fall away. Reproduced with permission—Silber, S. J.: *Microsurgery in clinical urology*, Urology, 6: 150, 1975.

to free a branch of the saphenous vein, swing it into the groin area and use it as an alternate vessel. Such was the case in this operation.

Dissection of the spermatic vessels proximal to the vena cava and aorta was facilitated by an intraperitoneal approach (fig. 5, A). In 1964 Hodges and associates noted that the spermatic vessels are small and delicate, requiring gentle dissection,⁹ yet the microvascular anastomoses were not unusually difficult to

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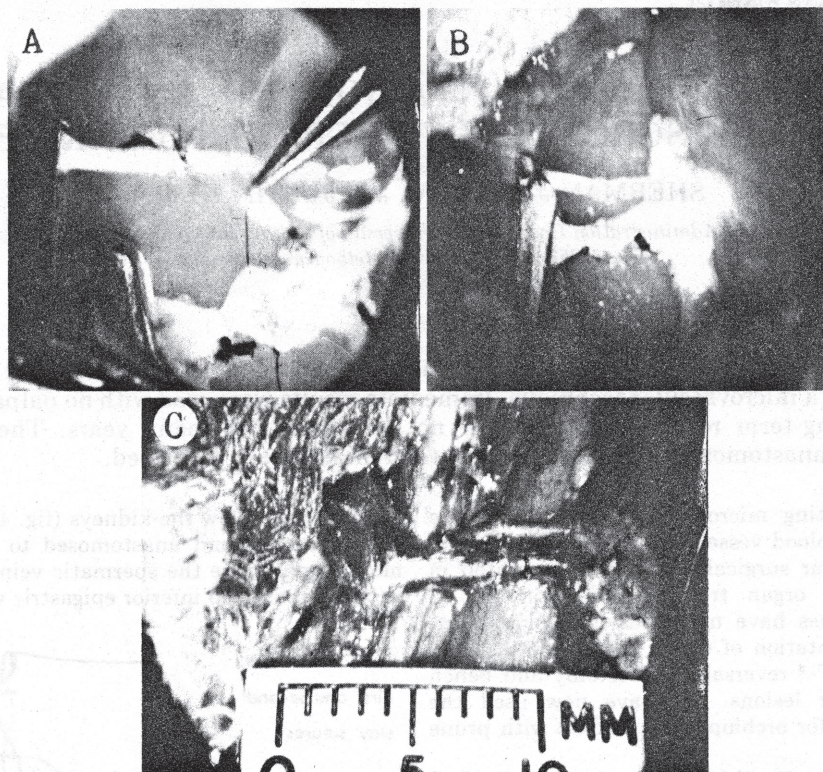


FIG. 2. A, 0.5 mm. artery has already been anastomosed and its accompanying vein (1.3 mm.) is being anastomosed. B, both microvascular anastomoses are completed but clamps have not been removed. C, anastomoses completed and clamps removed. Parts A and C reproduced with permission—Silber, S. J.: *Microsurgery in clinical urology*. Urology, 6: 150, 1975.

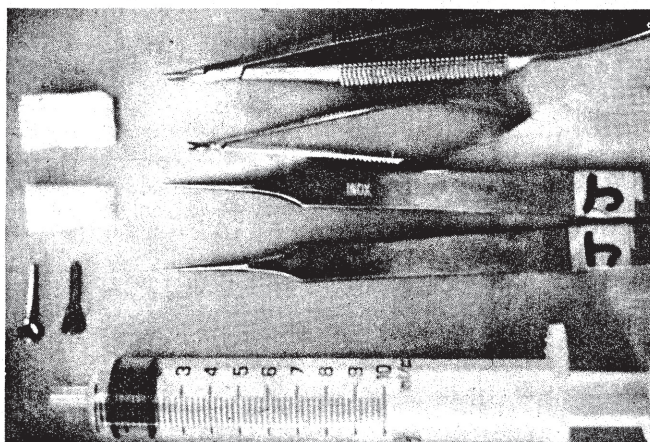


FIG. 3. Instruments required are Scoville-Lewis neurosurgical clamps, jeweler's forceps, microscissors and Barraquer needle holders. Reproduced with permission—Silber, S. J.: *Microsurgery in clinical urology*. Urology, 6: 150, 1975.

perform. Ischemia time was 28 minutes. Good pulsation was noted immediately in the spermatic artery and venous drainage was excellent.

This procedure allowed tension-free placement of the high testis into the scrotum (fig. 5, B). Although the long-term results regarding fertility will not be known for many years, the immediate results appear good. No testicular atrophy is detectable on palpation. Without microvascular orchiopexy the testis would have been removed or allowed to remain in the abdomen where an occult neoplasm might have developed. With our technique a viable testis was preserved in a position favorable for future observation.

DISCUSSION

In 1963 Fowler and Stephens presented an account of the collateral blood supply to high undescended testes and the results to be expected from division of the spermatic vessels.¹⁰ In their experience these testes could not be brought into the

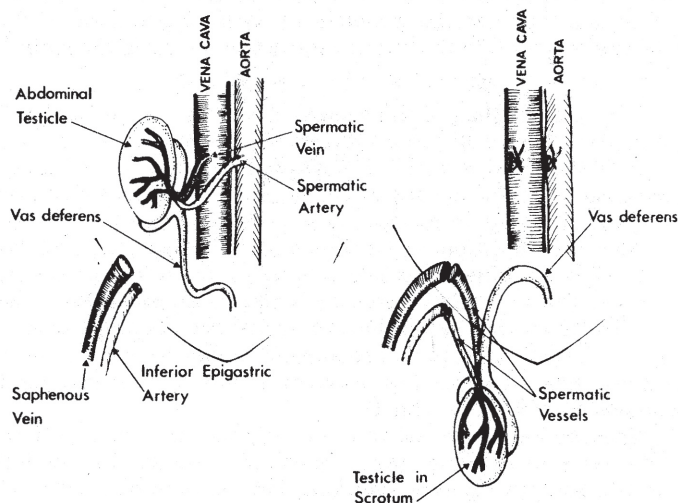


FIG. 4. Intra-abdominal testis can be autotransplanted to scrotum by direct microvascular anastomosis of 0.5 to 2 mm. spermatic vessels to inferior epigastric artery and vein. Branch of saphenous vein may be used as alternate vessel. Reproduced with permission—Silber, S. J.: *Microsurgery in clinical urology*. Urology, 6: 150, 1975.

scrotum without division of the spermatic vessels, and roughly half of them could be expected to atrophy. The others survived because they received blood supply via collaterals from the artery to the vas. These successes still could be subfertile because of reduced blood supply in the testes that appeared viable after orchiopexy. Fowler and Stephens believed their good results were owing to high division of the spermatic vessels, with subsequent salvage of the many tiny collaterals below.

Before the variable presence of these collaterals was known, results from orchiopexy for intra-abdominal testes where the spermatic vessels had to be ligated were disastrous.

In 1903 Bevan¹¹ and in 1910 Moschowitz¹² first advocated vessel division and claimed good results. However, in 1924 Mixer¹³ reported atrophy in 13 of 15 cases and in 1927

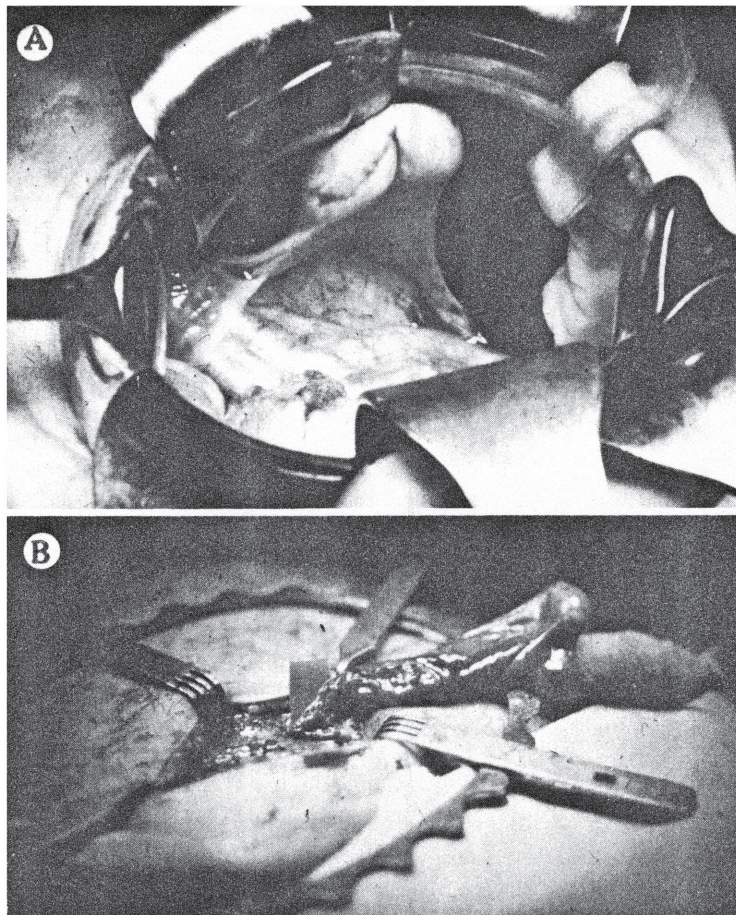


FIG. 5. A, high intra-abdominal position of testis requires division of spermatic vessels and delivery into groin area. B, with reanastomoses completed, testis can now be easily placed into scrotum. Part B reproduced with permission—Silber, S. J.: *Microsurgery in clinical urology*. Urology, 6: 150, 1975.

Wangensteen¹⁴ condemned the procedure on the basis of his experimental work on dogs. In 1935 MacCollum reported testicular atrophy (with a 10 to 20-year followup) in every patient on whom this technique was used at Boston Children's Hospital.¹⁵

In 1964 Hodges and associates speculated on the possibility of transplanting the origin of the spermatic artery (with a cuff of aorta) to a lower position in the abdominal aorta. They did this successfully in 14 of 16 dogs. Of the 16 dogs 11 suffered complications from closure of the aortic defect at the original site of the spermatic artery. All 5 in whom the defect was closed with a patch of rectus fascia did well. In 2 of the 14 successful cases damage to the spermatic artery of the animals required ligation and division. Although their concept was imaginative the procedure did not obtain clinical recognition because 1) the risk of a major vascular operation involving the aorta was not considered worth the benefit of orchiopexy, 2) with intra-abdominal testes division of the spermatic vein would also be necessary (especially on the left side) and 3) the use of the operating microscope to anastomose vessels as small as 0.5 mm. in diameter had not been developed.

The microsurgical approach that we used created no great risk since the aorta and vena cava were untouched. Because of excellent pulsations and venous drainage noted under the microscope when the clamps were removed, it was apparent that our procedure afforded a better chance of success than that of Fowler and Stephens and avoided the vascular risks of the operation by Hodges and associates.

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