Reconstruction of vaginal agenesis by Singapore flap

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Summary. Various surgical methods for reconstruction of vaginal agenesis have been described in the past. One of these is the neurovascular pudendal thigh flap described by Wee and Joseph [20] after they studied the blood and nerve supply of upper thigh skin, medial groin, and perineum in fresh cadavers. This technique involves elevation of two flaps extending laterally to labia majora in the groin crease and suturing them to each other in the midline after bringing them through tunnels formed under the labia majora, thus, creating a new vagina. In our clinic, 24 cases of vaginal agenesis have been reconstructed with neurovascular pudendal thigh flaps in a period of 33 months. The patients were observed for eight months to three years following the operation, and only in three cases did necrosis of the distal flaps occur; hair grew in the vagina in five cases, and shrinkage was observed in only one case. This rather easy technique is the ideal reconstructive method in the vaginal agenesis. However, hair growth in the vagina must be prevented, since this is the main patient complaint.

Key words: Vaginal reconstruction – Vaginal agenesis – Singapore flap

Vaginal agenesis occurs approximately once in every 5,000 female infants, usually with the Mayer-Rokitanski-Kuester-Hauser syndrome. The uterus and tubes are absent in classic cases, while the ovaries are normal. External genitalia are usually normal [3, 7, 8].

In cases where the vaginal agenesis is due to a fusion anomaly, and there is maldevelopment of the Müllerian canals, the incidence of skeletal anomaly is 10–15% [3]. Various surgical approaches may be used for reconstruction of the vaginal agenesis [3, 7, 8, 10, 18]. The split thickness skin graft method, first applied by McIndoe is still the most popular technique [13, 14].

Recently, two methods using sensate tissues have been described. Song, et al. [15] have used bilateral flaps from the labia majora and minor in order to reconstruct a vagina; this achieved a soft, pliable, durable and sensate vagina. The other method that make use of sensate tissue is the neurovascular pudendal thigh flap (Singapore flap) method [20].

Wee and Joseph [20] described this method after studying the blood and nerve supply of the upper thigh skin, medial groin and perineum in fresh female cadavers. They found that the internal pudendal artery supplies the perineum by means of its first branch, the inferior rectal artery, which courses through the anal region, and then by means of the perineal artery, which enters the superficial perineal pouch at the base of the perineal membrane. In this cadaver study, it was found that the perineal artery, after giving off the transverse perineal artery, continues on as the posterior labial arteries. This artery is the vascular axis of the pudendal-thigh flap. Wee and Joseph dissected the perineal regions of three female cadavers bilaterally. They found that the posterior region of the labia majora was supplied medially by the posterior labial branches of the perineal nerve from the pudendal nerve. Laterally, the perineum was supplied by the perineal rami of the posterior cutaneous nerve of the thigh. These nerves innervate the pudendal-thigh flap.

Materials and methods

In the period between August 1989 and May 1992, 24 cases of vaginal agenesis have been reconstructed using neurovascular pudendal thigh flaps. The ages of the patients ranged from 18 to 28 years (the average being 22.6). The patients had had urological, gynecological, and endocrinologic examinations prior to surgery. Renal tract anomaly was observed in six patients (25%). These consisted of one ptotic kidney, one hypoplastic kidney, one horse-
shoe kidney, three renal calix anomalies, and skeletal anomaly were observed in three cases (12%), and one single ovary was found in one case (4%). No hormonal disorders were observed in any of the cases.

The patients were anaesthetized and placed in the lithotomy position, a urine catheter was inserted. A transverse incision was made across the vaginal dimple; following this, a wide vaginal sac was formed by sharp and blunt dissection between the bladder and rectum. Dissection was extended to the peritoneum. Adequate hemostasis was obtained.

Two flaps, 13 to 16 cm long and 5 to 7 cm wide, were planned as described by Wee and Joseph in the groin crease. The groin crease formed the vertical axis with the flap (Fig. 1).

Flap elevation started from the medial edge. The fascia of adductor muscles was also included in the flap and at the subfascial plane, the distal and lateral edges were cut, and the flap was elevated from the distal to proximal. At the proximal edge of the flap, a subcutaneous pedicle was formed by a 4 cm subcutaneous dissection posteriorly. The same process was repeated on the other side (Fig. 2).

The two flaps were brought into the midline through tunnels created under the labia majora (Fig. 3). The distal edges of the flaps were sutured together. A new vagina was formed by bringing the lateral and medial edges side-by-side (Fig. 4). This new vagina was placed inside the previously prepared vaginal sac. The neck of the vaginal sac was sutured to raw edges on the perineum. Donor areas were closed primarily (Fig. 5). Vacuum drains were placed into the vaginal sac and the donor area. No attempt was made to fix the flaps in place at the apex; however, to maintain fixation of the flaps in the vaginal sac, antibiotic-soaked sponges were placed in the neovagina making sure that they did not unduly compress the flaps. There is usually enough room in the dissected space to accommodate the perineal flap with the underlying subcutaneous tissue. In patients who are overweight, the flaps are bulky, and there may be difficulty with flap insertion; this will then necessitate more extensive dissection.

Dressings were performed daily, and the flaps were examined. The drains were removed after 48 h. Coitus can commence after approximately 30 days.

Conclusion

The patients were observed for eight months to three years following the operation. Necrosis in the distal areas of the flaps was observed in three cases. This was bilateral in one case – this patient had developed a postoperative hematoma under the flap – and unilateral in two other cases. In cases where necrosis occurred, the patients were overweight, and the flaps were bulky. There were no problems in any of the other 21 cases. However, partial epidermal loss was observed in the distal areas of the flaps in all cases, but rapid reepithelialization occurred.

Fig. 1. The flaps are outlined lateral to the labia majora. The base of the groin crease was positioned so that it formed the vertical axis of the flap

Fig. 2. The flaps are raised on subcutaneous pedicles

Fig. 3. The flaps are tunneled under the labia majora

Fig. 4. A neovagina is formed by bringing the lateral and the medial edges side-by-side

Fig. 5. The neovagina is placed into the vaginal cavity prepared beforehand. The reconstructed vagina easily accommodates a vaginal speculum