Laparoscopic Mobilization of the Inferior Epigastric Artery for Penile Revascularization in Vasculogenic Impotence

A laparoscopic approach was used for penile revascularization in a patient with vasculogenic impotence to avoid the long abdominal incision which was traditionally required to harvest the inferior epigastric artery as a neoarterial source. Despite the time-consuming nature of laparoscopy, this procedure was as efficacious but less morbid and required less convalescence than open revascularization. Whether more patients may benefit from this procedure must be evaluated in further studies. *(JKMS 1997; 12 : 240~3)*

Key Words : *Laparoscopy, Impotence, Penile revascularization*

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INTRODUCTION

Many procedures of penile revascularization have been used for the treatment of vasculogenic erectile dysfunction (1, 2). One of the reconstructive vascular surgery techniques is arterialization of the deep dorsal vein for increment of blood inflow into the corporal bodies through the circumflex vein (3, 4). For deep dorsal vein arterialization the inferior epigastric artery is traditionally harvested through a long midline, paramedian or pararectal abdominal incision (5, 6).

Laparoscopic procedures have been applied recently as a minimally invasive treatment alternative to the traditional open surgeries in dealing with a variety of urological diseases (7~10). We report a case of combined arteriogenic and venogenic impotence treat with laparoscopic assisted mobilization of the inferior epigastric artery and microsurgical penile revascularization.

CASE REPORT

A 45-year old man had complained of erectile dysfunction since his penis was violently jerked by his friend's as a joke 5 years ago. There was no abnormality on physical examination and basic laboratory tests. The penile erection response by intracavernous injection of 30 mg papaverine was poor and still not full by additional manual stimulation. PBI (penile brachial index, normal range : 0.78 ± 0.15) was 0.58 with systolic brachial artery pressure of 140 mmHg. On duplex sonography, peak systolic velocity (PSV, normal range : ($\geq$25~30 cm/sec) and end diastolic velocity (EDV, normal range : ($\leq$5 cm/sec) of cavernous artery was 20 cm/sec, 7 cm/sec on the right side and 22 cm/sec, 8 cm/sec on the left side, respectively. The following dynamic infusion cavernosometry revealed intracavernous pressure decay of 2.5 mmHg/sec and cavernosal artery systolic occlusion pressure of 90 mmHg equally on both sides. Venous leak through right internal pudendal vein was demonstrated on the cavernosogram.

Under diagnosis of a combined arteriogenic and venogenic impotence, we performed simultaneous penile revascularization by deep dorsal vein arterialization using the Furlow-Fisher modification and ligation of right cavernosal and crural veins. We attempted the laparoscopic approach for dissection and mobilization of the inferior epigastric artery as a neoarterial inflow source.

Operative technique

With the patient under general anesthesia, a nasogastric tube and a urethral Foley catheter were inserted, and antiembolism pneumatic compression stockings were placed on both legs. A broad spectrum antibiotic, 500 mg cefazoline was administered intramuscularly 1 hour before the procedure. A 1 cm infraumbilical incision was made through the linea alba with the patient lying supine. Pneumoperitoneum was established with CO_2 insufflation through a 14 gauge Veress needle, and transperitoneal access was secured with a 10 mm trocar through the infraumbilical incision. Then, the 10 mm laparoscope was introduced into the abdominal cavity and the right inferior epigastric vessels were identified as being in a good state of development compared with the left one at the bilateral border of the rectus muscle of

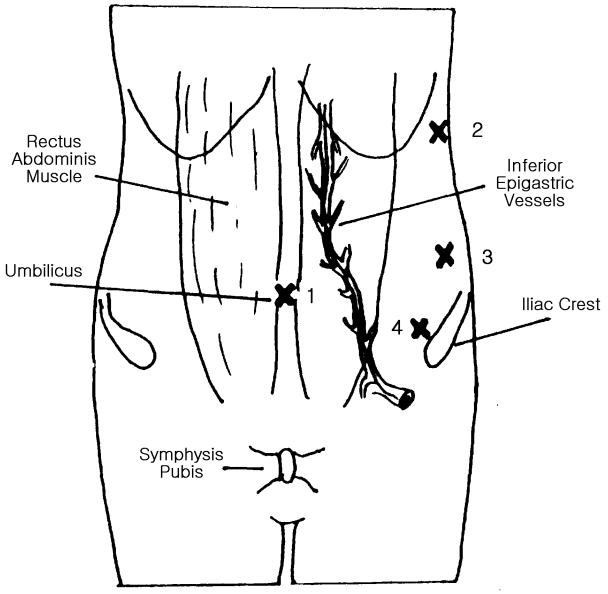

Fig. 1. Four trocar sites (posterior aspect of anterior abdominal view)

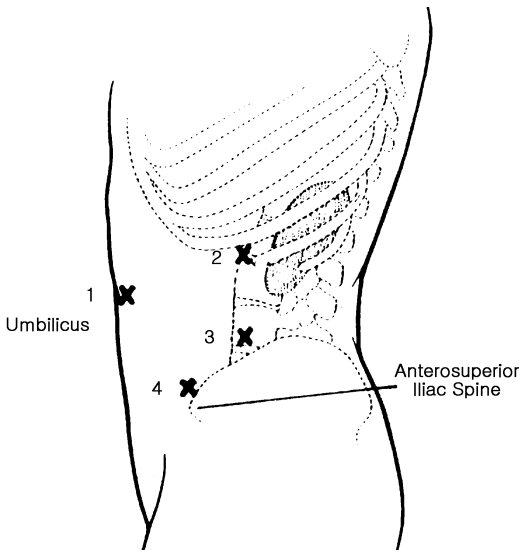

Fig. 2. Four trocar sites (lateral abdominal view)

anterior abdominal wall. The patient was turned to a 45-degree lateral decubitus position, and 3 additional trocars (one 10mm port and two 5mm ports) were placed on the left side of the abdomen with intervals of 8 cm in a longitudinal direction at sites further lateral than typically used for laparoscopic pelvic procedures. There were four port sites: 10 mm umbilical port, 5 mm midaxillary line (MAL) port at the level of the subcostal margin, 10 mm MAL port at the level of the iliac crest, and 5 mm anterior axillary line (AAL) port at the level of the anterosuperior iliac spine (Fig. 1, 2).

Dissection was initiated on the right epigastric vessels, but it was so hard due to poor visualization that we had to move to the left inferior epigastric artery. The peritoneum lateral to the inferior epigastric vessels was exposed. Gentle downward traction was used on the inferior epigastric vessels to pull the vessels away from the rectus muscle, and perforating branches were clip ligated and divided. The vessels were fully exposed by using blunt or sharp dissection between a point of origin from the external iliac vessels and a 3 cm cephalad point from a bifurcation of the inferior epigastric artery above the level of the umbilicus. At this cephalad margin of the dissection, the inferior epigastric vessel bundle was ligated with clip and transected. The vessel was mobilized for about 15 cm, ie, the distance necessary to reach the deep dorsal vein. Then, a 4 cm transverse incision was made at the base of the penis, and a long Kelly forcep was directed into the pelvis through the transverse incision under direct laparoscopic visualization. The superior end of the dissected inferior epigastric vessels was grasped and drawn to the area of the penile incision, extracorporally. The deep dorsal penile vein was dissected and ligated proximally near symphysis pubis and distally 2 cm behind the sulcus coronarius of glans. There were 4 emissary veins between the 2 ligations. Right end of the transverse incision at the penile base was extended longitudinally to be anterior scrotal peripenile incision, then the right cavernosal and crural veins were isolated and ligated. A microvascular anastomosis between the inferior epigastric artery and the deep dorsal vein was made end-to-end with 10-0 monofilament nylon.

The preoperative intracavernosal pressure of 5 mmHg was increased to 14 mmHg after the ligation and to 25 mmHg after the arterialization of the deep dorsal vein. The arterial pulsating was well transmitted to the deep dorsal vein with satisfactory hemostasis. Operation time was 5 hours for the laparoscopic dissection of the inferior epigastric artery. Estimated blood loss was 150 cc. Postoperatively, anticoagulant therapy with 300 mg of aspirin and 225 mg of persantin was maintained daily. The patient complained of mild suprapubic pain that did not require parenteral analgesics. The nasogastric tube and the urethral catheter were removed in the morning after the procedure. He was able to ambulate on postoperative day 1. On postoperative day 3 he tolerated a general diet. He was discharged on postoperative day 4. At 2 weeks of follow-up he had mild painful erection. He was allowed to resume all physical and sexual activity at 4 weeks. At 2 months he reported full erections with successful intercourse weekly.

DISCUSSION

Since the initial report of penile revascularization by Michal et al. in 1974 (11), a variety of operative procedures for vasculogenic impotence have been described. Most of these procedures usually use the inferior epigastric artery as a new arterial inflow source, because this artery has no occlusive lesions especially at the origin, expendable, readily accessible, and easily harvested to the level of the required anastomosis with sufficient length. For mobilization of the inferior epigastric artery the open surgical approach is traditionally performed through a long midline, paramedian or pararectal abdominal incision. However, there may be significant postoperative morbidities, especially wound pain, scarring and convalescence, since these open surgical dissections require long abdominal incisions and transection of the rectus muscle.

The rapid advance in the area of laparoscopic surgery in recent years has resulted in significant improvement for vascular dissection (12). The laparoscopic dissection of the inferior epigastric artery may be feasible and even more logical than open surgical approach because the magnified laparoscopic view enables the surgeon to dissect precisely, clip and transect the branches while preserving the main pedicle. And visualization of and access to the inferior epigastric vessels are excellent due to their location on the anterior abdominal wall posterior to the rectus muscles. However, because they are located directly anterior, it is advisable to place the working ports as far lateral as possible on the side contralateral to the vessel being harvested so as to allow greater angulation of the laparoscopic instruments and clip appliers toward the area of dissection (13). It is unlikely, in our experience, that the broad-based fatty urachus, the paired prominent medial umbilical ligaments and the small bowel will make visualization of the inferior epigastric vessels difficult. Thus, we discontinued the dissection of the right inferior epigastric vessels contralateral to the working ports and moved to the ipsilateral left vessels without turning of the patient's position. Amazingly, this approach was more convenient and it was easier to dissect the vessels than the previous approach. Therefore, it is advisable to mobilize the inferior epigastric vessels ipsilateral to the working ports. To avoid injury to the inferior epigastric artery, no attempt was made to separate the artery from the inferior epigastric veins during the laparoscopic mobilization. Even though the moderate bleeding occurs from the mobilized vessels in the peritoneal cavity, we think it would be advisable to control the bleeding extracorporeally after bringing the vessels to the outside of abdominal cavity due to the time-consuming nature of laparoscopic bleeding control.

Laparoscopically assisted penile revascularization with no abdominal incision has the potential advantages of decreased hospitalization, lessened postoperative pain, avoidance of wound infection and shorter outpatient convalescence. No scarring and more rapid return to normal social activity also lead to cosmetic and cost effectiveness. In contrast, in our experience with open surgical mobilization of the inferior epigastric artery for vascular reconstruction in 17 patients with ecrectile dysfunction during recent 5 years, 3 (17.6%) had complications of wound problems (wound dehiscence in 2 and accidental stitching of drain in 1), and 8 (47.0%) required parenteral anagesics (Pethidine HCl, Pentazocine, Tramadol HCl) once to 10 times with an average of 2.6 times. Postoperatively, the average hospital stay was 11.7 days with a range from 5 to 23 days. In addition, the inferior epigastric arteriography is mandatory in the open penile revascularization for selection of a more developed side out of the bilateral epigastric arteries. However, this selection of the more developed epigastric artery can easily be performed under laparoscopic visualization, and hence the none-necessity of invasive arteriography is one major advantage in the laparoscopically assisted penile revascularization.

We also consider that laparoscopic mobilization of the epigastric artery may have some role for the management of cryptorchidism if the microscopic testicular autotransplantation is needed in the patient with high-abdominal cryptorchidism (14). Whether more patients may benefit from this procedure must be evaluated in further studies.

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