

Full Length Research Paper

High ligation of internal spermatic vein under single-port Transumbilical laparoscopy in young patients

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In the present study, our clinical experience of high ligation of internal spermatic vein in single-port transumbilical laparoscopy was reviewed and summarized. Eleven patients with varicocele on the left side received high ligation of the internal spermatic vein in single-port transumbilical laparoscopy in our department. All operations succeeded and mean operation time was 26 min. None suffered from complications and mean hospital days were 4 days. The high ligation of internal spermatic vein under transumbilical laparoscopy is a new approach that can be applied in young patients. High ligation of internal spermatic vein under single-port transumbilical laparoscopy has the advantages in clear visual field, simple procedure, rapid recovery, minimal invasion low incidence of complications, and less difficulty for manipulating.

Key words: Varicocele, transumbilical laparoscopy, spermic vein ligation.

INTRODUCTION

There remain still controversies concerning the treatment of varicocele in young patients, but experts have reached the consensus that it is necessary to operate on patients with severe varicocele (Jarow, 2001). Traditional operations include scrotal incision, inguinal incision, retroperitoneal incision and laparoscopy (Austoni et al., 1998; Messina et al., 2003). The main difference lies in that the incision is above or below the internal inguinal ring. Since high ligation of internal spermatic vein under transumbilical laparoscopy as well as ligation via the retroperitoneal incision has been performed at the same site, the surgical efficacy may be similar. However, the conventional laparoscopy requires three orifices, so the scars still occur on the abdominal wall. Therefore, the

operation needs further improvement and optimization. From Jul 2008 to Oct 2009, high ligation of internal spermatic vein was performed in 11 young patients with varicocele using transumbilical laparoscopy, with favorable efficacy achieved.

PATIENTS AND METHODS

Clinical data

Clinical reports were collected from a total of 11 patients aged 16 to 21 years (mean age: 18.5 years). These patients were diagnosed with severe varicocele, within the course of 6 to 30 months. The diagnosis of aricocele was based on physical examination and ultrasonography (Cornud et al., 1999). All the patients were admitted into our hospital due to scrotum discomfort. After standing, varicose spermatic veins were present and patients had clinical manifestations characterized by a feeling of scrotal swelling. The new technique has been approved by local ethic committee and the patients or their relatives signed the informed consent.

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Figure 1. Flexible elastic separating plier and elastic separating scissor.



Figure 2. Small scar on the abdominal wall (3 days postoperation).



Figure 3. No scar was observed on the abdominal wall (7 days postoperation).

Procedures

The laparoscope was replaced by a 30° wolf with a diameter of 4 mm (Figure 1). Patients were fasted for 4 to 6 h before surgery. After complete urination the catheter was removed. Then, intravenous anesthesia was carried out, followed by tracheal intubation. The patient lied in a supine position with the head of the bed elevated to 30°. This was related to the post-operative habit. The bilateral diseases could be treated simultaneously in a supine position. A 20 mm arc incision was made below the umbilicus, and the skin and protheca were separated. The abdominal wall was raised with two towel clamps followed by insertion of veress and inflation of CO₂ with a pneumoperitoneal syringe. The abdominal pressure was maintained between 10 and 12 mmHg and a self-made puncturing device with a single orifice and two channels was pierced into the body.

The channel for laparoscopy was 5 mm in width, and the other operational channel was 10 mm in width. Spermatic vein was freed with the flecional clamp. Then, the wolf with 4 mm external diameter was inserted as the laparoscope followed by insertion of the operation clamp. The posterior peritoneum was exposed. Then, the spermatic vein was carefully separated till the spermatic vein was seen fluctuating and the vas deferens and its adjoint vascular moved downward in the form of herringbone nearly 2 cm away from the orifice of the internal ring.

Then, the separating pliers and the peptide clamp were altered in the operational channel. The pure spermatic vein was completely separated with 4 peptide clamps and ligated at the 1.5 to 2.0 cm upper the bifurcation. In the right middle of peptide clips, the internal spermatic vein was disconnected by the unipolar electrocoagulation. If bleeding and abnormality were not observed, puncture cannula was retracted from the orifice of umbilical peritoneum and then the wound was closed.

RESULTS

All laparoscopies were all successfully performed, and no severe complications were noted. The operation time last for 21 to 43 min (average: 26±1.5 min). The hospitalization days were 2 to 5 days (average: 4 ±0.5 days). The scar caused by the laparoscopies was shown in Figures 2 and 3.

DISCUSSION

Varicocele is a quite common disease of urinary system and andriatrics (Meacham et al., 1994), and caused by abnormal enlargement of the scrotum vein. Upward flow of blood in the veins is ensured by small one-way valves that prevent backflow. Defective valves, or compression of the vein by a nearby structure, can cause dilatation of the veins near the testis, leading to the formation of varicocele. Varicocele is quite prevalent in teenagers. Severe varicocele may result in sterility (Austoni et al., 1998). About 4.1 to 16.2% of teenagers have varicocele (Pintus et al., 2001; Stavropoulos et al., 2002). There are controversies on the timing and approaches for the treatment of varicocele. Some researcher such as Skoog et al. (1997) disagreed to perform preventive operation in teenagers, because all patients would not be sterile when they became adults. However, almost all urological

experts reach an agreement that it is necessary to operate on patients who suffer from severe varicocele and evident scrotum dilatation.

Currently, it is indicated that ligation of spermatic vein is not enough to improve the quality of semen (Thomas and Elder, 2002; Cameron et al., 1980). However, surgery is a quite effective strategy under this condition under which medication is apparently ineffective. Following the application of high-tech in urology and andrology, high ligation of spermatic vein via retroperitoneum has been performed worldwide (Kass, 2001). This surgery achieves favorable outcome, with a relatively low recurrence rate. But it is a major injury and a scar 3 to 5 cm in length can be observed post-operation.

In recent years, with the development of minimally invasive technology, high ligation of spermatic vein under laparoscopy attracts increasing attention and has become a major approach for the treatment of varicocele. Compared with the open surgery, this surgery has many advantages, such as the favorable efficacy, minimal invasion, few complications, simultaneous operations on the right and left varicocele, rapid recovery, and short hospitalization days. Under laparoscopy, adequate light and clear vision are enough to completely separate the spermatic vein. In addition, the internal spermatic vein can be magnified to facilitate the separation, but the recurrence rate is also low. Meanwhile, since the ligation is performed at a high level, it will not hurt the vas deferens as well as other arteries and veins. Additionally, it is not necessary to anatomize the cremaster muscle avoiding the damage to the external spermatic vein as well as the artery and vein of vas deferens. As a result, the establishment and recovery of collateral circulation after surgery are promoted. Thereafter, some surgeons propose the two-port approach (puncture two orifices with a diameter of 10 mm on the abdominal wall), and the efficacy is quite the same as the above one. High ligation of internal spermatic vein in laparoscopy with two micro-holes is also an acceptable strategy.

High ligation of spermatic vein under transumbilical laparoscopy with one port bears all advantages of high ligation of spermatic vein under laparoscopy. In addition, it also keeps the abdominal wall relatively complete. Moreover, the damage to the abdominal wall is also minimal. So it will be more reliable and acceptable for young patients. This surgery applies the most advanced technologies of natural orifice transluminal endoscopic surgery (NOTES) to treat the common diseases of urologic surgery and andriastrics.

The NOTES is a brand new technology, and the transformation of minimal invasive technology, marking a new era of minimal invasive therapy (Rattner and Kalloo, 2006). Therefore, some one regarded it as a "second revolution" of minimal invasive therapy. However, there are still many limitations (Kalloo et al., 2004). It is inevitable that some surgical complications (bleeding, fistula, and organic damage) will be observed in the early

period. Presently, the NOTES in China is still in the initial phase, the trials and technological support are insufficient (Kikuchi et al., 2009). There are still some technological problems, such as how to incise the peritoneum, how to avoid damages to organs near the site of operation, how to separate the tissues, how to stop bleeding, and how to match the tissue. In addition, there are many non-technological problems. For instance, what are the fundamental strengths of NOTES? Who will and can carry out NOTES? Where is the NOTES performed? Moreover, there are some difficulties concerning surgeon training. In recent years, NOTES is an object with most disputation and rapid development. Some researchers propose that NOTES will be another landmark in the surgical history after minimal invasive laparoscopy. The occurrence of NOTES changes people's perception of traditional surgery. However, transumbilical endoscopic surgery (E-NOTS) has more advantages, and it initiates a "scar-free era" in the treatment of numerous diseases (Lim et al., 2009).

In the treatment of varicocele of 11 young patients, we had the following experience. Firstly, the E-NOTS just needs a single-port of 15 mm at umbilicus, which is minimally invasive. After recovery, the scar can barely be observed on the abdominal wall which attracting attentions of many patients. Secondly, the drainage of spermatic vein is fixed and distinguishable, and there is much experience about conventional high ligation of spermatic vein under laparoscopy. Replacing the laparoscope with the 4 mm wolf can also achieve therapeutic efficacy, ensure the clear vision and avoid accidental injury. Thirdly, it is not difficult to utilize the tensile and twistable separating forceps and scissors in the single channel. In the 11 operations, it takes less than 45 min on average to complete the surgery without complications. In the operation, the peptide clip was used to ligate the spermatic vein, achieving favorable efficacy. Fourthly, there is no need to supplement new equipments, because all the external diameters of wolf, transurethral electric resectoscope and visual pipe of hystero-scope are 4 mm and any equipment is applicable for laparoscopy. Additionally, these equipments are quite common in laparoscopy, and available. In a word, the high ligation of spermatic vein in transumbilical laparoscopy with one-hole method spends less time and brings extremely small damage representing a safe and reliable approach. In addition, it keeps the integrity of abdominal wall and scar can be barely observed. Therefore, it is an ideal strategy deserving clinical generalization.

In this study, we entitled the technology the scar-free transumbilical laparoscopy in single-port method with two channels, aiming to differ it from single-incision laparoscopy. The latter surgery was reported long before and took advantages of a diagnose laparoscopy with an operational channel (like WOLF, 8912.402) to perform some simple operations in combination with a second puncture needle. There are many reports that this technology is applicable in the treatment of some diseases,

such as hernia repair and appendix resection. Study also showed it was applied in the renal cyst decortication under retroperitoneal laparoscopy. The single-incision laparoscopy has minimal invasive effects but is difficult to accomplish simple operation under the scope, which limits its wide application. Based on E-NOTES, the transumbilical laparoscopy in one-port method with two channels is able to implement most regular surgeries by two twistable devices (Gill et al., 2008), and promising in the future clinical application. As the surgery requires skilled operation, it is feasible to apply this technology to the complicated plastic surgery of upper urinary tract in laparoscopy in single-port method. The patients suffering from stenosis of upper urinary tract are mainly children and teenagers

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