

Uterovaginal fistula after laparoscopic excision of uterosacral endometriotic nodule

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Received: 9 October 2006 / Accepted: 13 December 2006 / Published online: 23 January 2007
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Abstract A uterovaginal fistula was reported after an uneventful laparoscopic excision of a left uterosacral endometriotic nodule in a young woman. Indirect thermal injury to the left ureter by the bipolar grasping forceps was the main cause of the injury. Contributing factors are analyzed and preventive measures pertinent to this case are discussed.

Keywords Thermal injury · Ureteral damage · Bipolar · Fistula · Laparoscopic

Introduction

Ureteral injury is one of the commonest sites of complication in laparoscopic gynecological surgery, after intestinal and vascular injuries. The obvious visual advantage conferred by the endoscopic equipment has not reduced the incidence of ureteral injuries as one would have imagined. Laparoscopic ureteral injuries occur in approximately <1–2% of all cases [1], higher than the average incidence of 0.3–0.4% [2, 3] observed in open gynecological surgery.

Six types of operative ureteral injuries have been described in open surgery, namely, crushing, ligation, transaction, angulation, ischaemia and resection. Laparoscopic ureteral injuries are unique when compared to open injuries as they are more likely to result from a thermal injury [1, 4], which in turn leads to ischaemic changes and fistula formation. Over enthusiasm in dissecting adventitial

sheath of the ureter also increases the probability of devascularisation and ischaemia. A laparoscopic ureteral injury is more likely to be undetected at the time of the operation [1, 5], thus presenting only after a significant time interval after the surgery. The failure to recognize such anatomic disruption is often due to the fact that the surgeon does not suspect a ureteral injury [6]. These two factors seem to decrease the success of a primary repair [7] and increase the risk of a long term complication [4].

Trauma to the ureter commonly occurs at the cardinal ligament where the ureter crosses under the uterine artery, at the ureteric canal (tunnel of Wertheim), at the intramural portion of the ureter, dorsal to the infundibulopelvic ligament near or at the pelvic brim and at the lateral pelvic sidewall above the uterosacral ligament.

Case report

A 24-year-old woman with two previous diagnostic laparoscopies for pelvic pain presented with dyspareunia and dysmenorrhoea. Intravenous pyelogram (IVP) showed medial deviation of the left ureter, suggestive of a left uterosacral endometriotic nodule. Anorectal ultrasonographic examination was negative for rectovaginal nodule.

Laparoscopic examination revealed a thickened endometriotic nodule at the level of the left uterosacral ligament close to the uterus. The left ureter was identified at the lateral pelvic side wall and carefully dissected out using bipolar grasping forceps and monopolar scissors. Stenosis of the left ureter was noted at the level of the nodule, where fibrotic tissue encased the ureter. Normal peristalsis of the left ureter was observed after adhesiolysis of the fibrotic endometriotic tissue. The 3 cm left uterosacral endometriotic nodule was then excised.

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Postoperatively, the patient had a low grade fever which resolved with antibiotics. Ultrasound of the abdomen and pelvis were normal. She was discharged on the fourth post-operative day.

Three weeks after the laparoscopic procedure, the patient complained of urinary leakage from the vagina. A repeat IVP showed a left uretero-vaginal fistula (Fig. 1) situated 4 cm above the bladder insertion of the ureter. Laparoscopic repair of the left ureter was performed. Intraoperatively, the site of the left ureter near the left uterosacrals was thickened with fibrosis. There were no obvious adhesions. The fistula was not immediately apparent. Fibrotic tissue was removed, the left ureter identified and dissected out. The uretero-vaginal fistula location was noted 4 cm above the bladder insertion of the ureter, exactly where it was shown in the radiograph. A double-J stent was placed with the help of the cystoscope. End-to-end reanastomosis of the left ureter was carried out with three interrupted 4-0 sutures. An abdominal radiograph confirmed the position of the double-J stent. She was discharged well on the fourth post-operative day.

Retrospectively, the video sequence of the patient's first intervention was reviewed. The left ureter at the location of the endometriotic nodule was fully dissected and separated from the diseased tissue. Thermal damage to the left ureter

was sustained with the bipolar grasping forceps at the non-insulated articulation point as a result of non-ergonomic placement of the instrument. This happened at the level of the left utero-sacral ligament when the endometriotic nodule was being resected and during haemostasis of small vessels. The ureter was situated in the posterior leaf of the broad ligament and passes virtually external to the utero-sacral ligament at the point of injury (Fig. 2). The bipolar grasping forceps were working from the left lateral port site which is parallel to the left ureter, making the left ureter susceptible to injury by thermal contact.

Discussion

The risk of ureteral injury depends on the indication for and the kind of pelvic surgery performed, though an average incidence of about 0.4% is widely and consistently reported in case series [4]. The comparatively higher incidence in laparoscopic procedures has been attributed first to the level of experience of the surgeon and thereafter to the proportion of major and advanced laparoscopic surgical procedures [8]. It is an oversimplification to state that every specific type of ureteral injury can be prevented in a specific and a universally applicable way. We have

Fig. 1 Left uretero-vaginal fistula



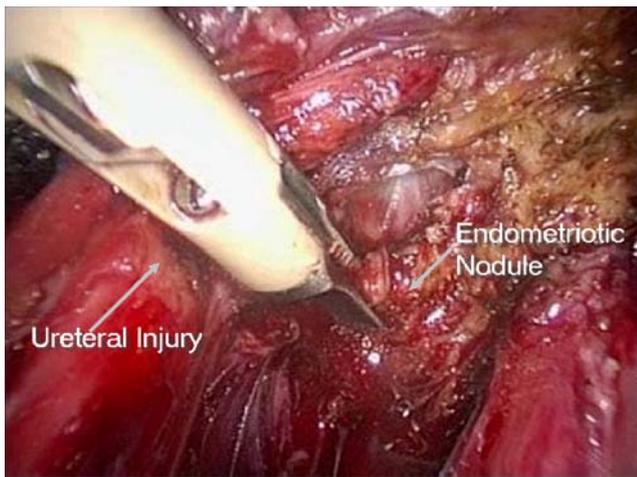


Fig. 2 Ureteral injury

identified the potential contributing factors particular to this case and analyze how they may be avoided in future.

The surgeon must constantly and unequivocally know the exact location of the ureter. It is almost mandatory to identify and dissect out the ureter for advanced laparoscopic gynecological cases like severe endometriosis as in the case of our patient. In such cases, the anatomy can be totally distorted, making meticulous dissection essential. Pre-operative IVP was excellent to map the course of the ureter in this instance.

The ureter obtains part of its blood supply from every vessel that it transverses. Of all the layers of the ureter, the outermost adventitia contains an intercommunicating network of blood vessels. This vigorous and multi origin blood supply makes the ureter resistant to devascularisation, even when it has been stripped of the surrounding ureteral sheath. But ischaemic injuries can still happen when there is excessive dissection of the adventitia, or if one fails to remember the origin of the blood supply. Below the pelvic brim, the blood supply enters from the lateral side of the ureter, thus it has been advised that dissection and mobilization be carried out from the medial aspect of the ureter [4]. Staying outside of the adventitial sheath when performing ureteral dissection can decrease the probability of devascularisation and ischaemia, though this may not be feasible in pelvis with significant scarring from endometriosis, radiation, infection, previous surgery, or in cases of malignancy.

In the case of this patient, the anatomy in the region of the left uterosacrals was altered as a result of endometriotic changes. Dissection was performed just sufficient to free the tissue around the disease. Extensive dissection is not advisable if it does not confer any advantage to the surgery or the patient. Electrosurgery was employed to a minimum, enough to allow for separation of tissue planes and for the purpose of haemostasis. It was to our chagrin that the

bipolar grasping forceps (Fig. 3) have a metallic articulation point just 1 cm distal to the teeth of the forceps which is not insulated. When the bipolar forceps were in use, this metallic articulation point was seen to be firing current with leakage to the left ureter. This thermal injury was the main contribution to the ureteral injury sustained, when dissection and haemostasis was being carried out.

Electrosurgery is now an indispensable part of modern-day operative laparoscopy. Electrosurgical energy is extensively employed for haemostasis as well as for tissue cutting and, as such, the surgeon should know exactly how broad the zone of thermal injury is for a particular instrument at a specific power setting [9]. Although the mean distance of thermal damage with some of these instruments such as the Ligasure is approximately 2 mm, it may be as much as 5 mm [4]. There is thus a potential for delayed necrosis when used within the 5 mm zone [10].

Indirect thermal injury caused by insulation failure is rare with the improved quality of instruments. Such injury is difficult to notice at the time of surgery as it is least expected. When there is inadequate insulation around the diathermy charged core of the instrument, there may be unwanted current leakage to non-targeted tissues [11].

The specific instrument employed in our case was the rotating bipolar grasping forceps (RoBi). It is an ideal tool in laparoscopy for grasping and dissecting due to its special joint coupling [12]. In contrast to the traditional Kleppinger bipolar forceps, the presence of the specific articulation joint at the fulcrum of the two active jaws (Fig. 3) allows not just grasping function, but also precise dissection. The jaws of the RoBi can be opened by the surgeon, unlike the Kleppinger which relies on a passive motion, and thus, the surgeon is able to determine the force to be exerted on the handle which is in turn transferred to the tissue. This feature has allowed the RoBi to be an excellent tool in many laparoscopic procedures. One major

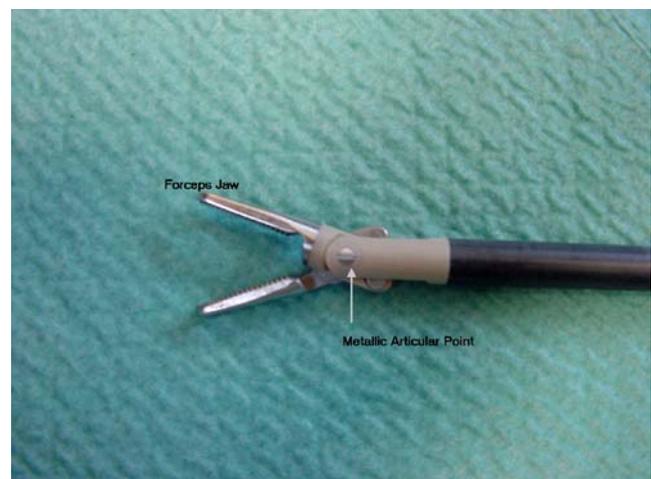


Fig. 3 Bipolar grasping forceps

setback in the design is presence of the non-insulated joints, which can lead to indirect thermal injury as in our case. Precaution must be taken when using this instrument to ensure that there is no critical viscera in contact with the actively charged joints when the bipolar pedal is activated.

Such injury could also have been prevented with alternative operative ergonomics. The injury occurred as the bipolar forceps was placed in the left lateral port which resulted in the instrument being aligned parallel to the left ureter, allowing an increased contact surface area of the bipolar rod with the left ureter. This could have been avoided by introducing the bipolar forceps from the middle supubic port instead, as this would allow our instrument to be at a perpendicular angle to the area of dissection, minimizing surface contact area.

An additional measure which could have been taken involves placement of a prophylactic double-J stent if the ureteral damage had been suspected intra-operatively. This would allow the involved ureter to recover from the ischaemic injury with vascular regeneration and avoided an additional surgery for our patient. We would like to emphasize that in the case of our patient, the suspicious area near the left ureter was thoroughly inspected at the end of the first surgery for endometriosis. Healthy peristalsis of the ureter was observed and a decision was made not to place a stent. We thus conclude from here that if there is any doubt ureteral injury exists, one should not hesitate to place a double-J stent. It might mean temporary inconvenience for the patient but it would help to avoid long term complications and surgeries.

Conclusion

Thermal damage to the ureter, however slight, should not be taken lightly. Serious consequences such as a fistula formation can cause compelling distress to patients. With appropriate supervision and training, major complications including ureteral injury in standard laparoscopic operations such as hysterectomy have shown a substantial decrease in the late 1990s [13]. But significant increase in the proportion of advanced laparoscopic procedures such as difficult hysterectomy, treatment for incontinence and prolapse, together with resection of retroperitoneal endometriotic lesions has accounted for an increase in the rate of urological complications in the new millennium [8]. The

legal ramifications of such complications remind surgeons to be scrupulous and meticulous about following the elementary safety rules. A poor understanding of causative factors is no defense for any laparoscopic surgeon. We should aim to be alert not only to prevention, but also to the timely recognition and prompt appropriate intervention.

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