Robotic-assisted inguinal lymph node dissection: A preliminary report

P. N. Dogra, Ashish Kumar Saini, Prabhjot Singh
Department of Urology, All India Institute of Medical Sciences, New Delhi, India

ABSTRACT
Penile cancer with inguinal lymph node metastasis is a common cancer in India. Open inguinal lymphadenectomy is the gold standard treatment of metastatic inguinal lymph nodes. We report our experience and technique of robotic assisted inguinal lymph node dissection in two patients presented with palpable inguinal lymph nodes, which to our knowledge is the first reported case series from India.

Key words: Penile cancer, Robotic-assisted inguinal lymph node metastases

INTRODUCTION
Penile cancer spreads in a stepwise expected pattern with involvement of regional inguinal lymph nodes, first followed by pelvic nodal metastasis and then distant spread. Open lymphadenectomy which is the gold standard treatment of metastatic inguinal lymph nodes has obvious survival benefits for patients when applied to individuals at risk for and with lymph node metastasis. Open lymphadenectomy with its modification vis-a-vis use of thick skin flaps (based on the blood supply superficial to Scarpa’s fascia) and avoidance of vertical incision; complications of flap necrosis, seroma, lymphocele, cellulitis, and leg edema can distress as many as two-thirds of patients. Nevertheless, the current morbidity of the standard technique of open lymphadenectomy (ILND) is a stumbling block to its widespread application, and pioneering strategies to reduce the morbidity of lymphadenectomy taking into account oncologic efficacy must be developed and standardized. The strategies currently in vogue are centered on improving patient selection for ILND by performing dynamic sentinel node biopsy and the more popular strategy for plummeting the morbidity of ILND employing minimally invasive laparoscopic techniques, namely video endoscopic inguinal lymphadenectomy (VEIL) and endoscopic lymphadenectomy for penile cancer (ELPC), without compromising the oncologic efficacy. Robotic technologies permit improved magnification, 3-dimensional optics allowing for greater precision, dexterity, and degrees of freedom than that attainable using standard laparoscopy. We report a case series of two patients with penile carcinoma and palpable bilateral inguinal lymphadenopathy who underwent staged bilateral inguinal lymphadenectomy using the da Vinci S robotic system (Intuitive Surgical, Mountain view, CA).

MATERIALS AND METHODS
Two patients age 38 and 46 years, respectively, presented to our institution with a penile mass and persistent palpable bilateral inguinal adenopathy (1-2 cm). Pathologic examination of the partial penectomy revealed Stage T1G1 squamous-cell carcinoma in both the cases. The patients were counseled regarding different treatment option understanding the possibility of open conversion if concerns were present for oncologic safety and they elected to undergo robotic-assisted inguinal lymph node dissections (RAILND).

Our technique
The patients were placed in the supine position with the ipsilateral leg (left) abducted and padded with the contralateral leg kept straight. The inguinal and groin...
areas were prepared and draped and a Foley catheter was placed. A 2-cm transverse incision was made approximately 25 cm inferior to the midpoint of inguinal ligament, at the inferior aspect of the femoral triangle to develop the space just deep to Camper’s fascia and vertical lines drawn 15 and 20 cm from pubic tubercle and anterior superior iliac spine, respectively, to mark out the area needed for space creation. The subfascial space was created using peritoneal balloon dissector along with blunt and sharp dissection. A blunt tip balloon trocar was used for the midline robotic camera port (0°) and then two working robotic ports (8 mm) were placed approximately 8 cm away from the camera port making an isosceles triangle with camera port, and a 12-mm assistant port was placed in between the camera port and the lateral robotic port [Figure 2]. After positioning the operating table at the lowest height, the da Vinci S robotic system was docked at 30° to the contralateral thigh from the head end. The subcutaneous tissue was insufflated with CO₂ gas at 12 to 15 mm Hg. We used bipolar precise, prograsp forceps in the left robotic arm, and monopolar scissors, harmonic scalpel in the right arm for dissection. The boundaries of the dissection extended from the inguinal ligament superiorly, the sartorius muscle laterally, and the adductor longus muscle medially. The saphenous vein was identified and spared, and the small branches of the femoral artery and vein were clipped and divided [Figure 3]. Lymphatic tributaries were controlled using either bipolar/monopolar/harmonic energy to prevent postoperative lymphatic leakage. The dissected superficial nodal package was entrapped separately in a bag and placed laterally for removal at the end of the procedure. Consequently, the femoral artery and vein were skeletonized while preserving the saphenous vein. The dissected deep lymph node packets were removed separately. The insufflation pressure was decreased to confirm hemostasis. We applied Tisseel (Baxter, Deerfield, IL), a hemostatic agent, to the surgical bed in the second case. The specimen was removed at the completion of the procedure from the camera port incision.

Figure 1: CECT pelvis depicting bilateral inguinal lymph node metastasis

Figure 2: Robotic port placement- 12-mm camera port placed 25 cm from midpoint of inguinal ligament, 2 robotic parts (8 mm) placed 8 cm apart making isosceles triangle, 12-mm assistant port between the camera port and lateral robotic port

Figure 3: Intraoperative view following completion of lymphadenectomy

Figure 4: Postoperative photograph
A closed suction drain was placed to prevent lymphocele formation, and crepe bandage were applied to decrease the edema.

RESULTS

The total operative time was 90 to 110 minutes; the estimated blood loss was 50 to 100 ml. Both the patients underwent dissection of the contralateral side after 2 days in the same admission. The instrument setup and robot docking were replicated on the other side. The operative time for the second dissection was 110 minutes, with an estimated blood loss of 50 ml. The patients were discharged on postoperative day 2 with advice regarding drain care and 1-week course of oral antibiotics. No postoperative complications developed. The indwelling drain were removed at 10 and 7 days, respectively, after surgery when the output was 50 ml/d. Pathologic examination revealed four lymph nodes with metastases on the right side in case 1 and two lymph nodes on the left side in case 2. There was no metastatic involvement in superficial/deep inguinal lymph nodes on the left in case 1 and on the right in case 2. There were no wound-related complications or lower extremity edema in follow-up [Figure 4]. Drain output was less and removed earlier in case 2 as compared with case 1 which may be because of Tisseel application.

DISCUSSION

Penile cancer is a common cancer in India and is psychologically devastating for the patient, with the current conventional treatment modalities adding to the misery. In patients undergoing prophylactic Inguinal lymph node dissection (ILND) for impalpable nodes, 20 to 25% were found to have metastases, whereas 50 to 80% of palpable inguinal nodes harbor metastases. ILND, when done meticulously and timely, is associated with equivalent survival rates for patients with palpable disease with pN1 compared with pN0 disease. ILND has a role to play in high-risk patients with clinically negative nodes, because growing evidence has clearly shown a survival advantage for those undergoing early rather than delayed ILND. Open ILND at times requires long skin incisions, creation of skin flaps beneath Scarpa’s fascia, and excision or division of lymphatic’s. Despite the survival benefit, traditional open ILND can have significant morbidity, and has been reviewed in recent times by Protzel et al. Recent series however shows that the morbidity of ILND has decreased, with Bouchot et al. reporting 12% overall complication rate. Nonetheless, many centers have higher complication rates with significant operative morbidity, even in the most experienced hands. Minor complications (superficial wound dehiscence, mild edema, seroma) can occur in up to two-thirds of patients, while major complications (flap necrosis, deep vein thrombosis, lymphocele requiring drainage) occur in one third. Modified ILND has been advocated in an effort to decrease the postoperative morbidity while not compromising oncologic safety employing the use of thick skin flaps based on the blood supply superficial to Scarpa’s fascia, dissecting medial to the course of the femoral nerve, smaller skin incisions, preservation of the saphenous vein, and excluding transposition of the sartorius muscle. Despite these modifications, 36% minor complication rates, deep vein thrombosis, and even myocardial infarction have been reported. These results have galvanized the strategies for reducing the morbidity of ILND using minimally invasive laparoscopic techniques as described first by Bishoff et al. in a cadaveric model. Its consequent application in human subject was met with difficulties owing to a large, adherent node to the femoral vessels and required an open conversion. It was the work of two pioneering groups of Tobias-Machado et al and René Sotelo et al. who addressed these issues and named these laparoscopic procedures as VEIL and ELPC, respectively. These groups reported significant reduction skin-related morbidity, equivalent oncological efficacy and lymph node harvest, although the lymphatic complications were similar to modified or superficial dissection. In our two cases, we found that the application of Tisseel in the second case led to a significant reduction in drain output. Josephson et al. reported his experience of robotic inguinal dissection in one patient. His operative time was 130 minutes as compared with our operative time which was 90 to 120 minutes. Our experience is the first Indian experience of robotic inguinal lymph nodal dissection.

CONCLUSIONS

We believe that RAILND is an efficacious, minimally invasive procedure with minimal morbidity and has a place in managing patients with carcinoma of the penis in India. It also opens a new chapter in the extended use of robotics in urology, thus reducing cost and increasing its multidimensional applicability.

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