Video endoscopic inguinal lymphadenectomy for radical management of inguinal nodes in patients with penile squamous cell carcinoma

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Abstract

Background: Inguinal lymph node involvement is an important prognostic factor in penile cancer. Inguinal lymph node dissection allows staging and treatment of inguinal nodal disease. However, it causes morbidity and is associated with complications such as lymphocele, skin loss, and infection.

Aims: To report our institutional experience with video endoscopic inguinal lymphadenectomy (VEIL) for radical management of inguinal nodes in patients with penile squamous cell carcinoma.

Materials and Methods: It is a prospective analysis of data of patients that underwent VEIL, by a single surgeon, from 2008 to 2015. 14 patients of penile carcinoma were suitable for VEIL technique were included in this study and followed. Data analyzed included mean operative time, mean lymph node yield, intraoperative complications, cutaneous complication, lymph-related complications, and surgical emphysema.

Results: The mean age of patients was 57.8 years (range: 45–70 years). Mean operative time for VEIL was 194.86 min (178–210 min). Mean lymph node yield was 7.68 (range: 5–11 nodes). No intraoperative complication was experienced during series. We noted no cutaneous complications, localized lymphocele were seen in total 6 units out of 22 units (27.2%). Surgical emphysema is seen in 3 limbs (13.63%). There was significantly decreased overall morbidity in our study. Follow-up of 10 out of 14 patients with median of 48 months shows no recurrence.

Conclusions: In our early experience, VEIL is a safe and feasible technique in patients with penile carcinoma who require radical inguinal lymphadenectomy. It allows the removal of inguinal lymph nodes within the same limits as in conventional surgical dissection and reduces surgical morbidity substantially.

Key Words: Radical inguinal lymphadenectomy, squamous cell carcinoma of penis, video endoscopic inguinal lymphadenectomy

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INTRODUCTION

After treatment of the primary, Inguinal lymphadenectomy is indicated in patients with penile or urethral cancer, when
(1) there is a lymph node mass that does not disappear with antibiotic therapy, (2) when palpable lymph nodes appear in the postoperative follow-up, (3) when there are risk factors for the development of inguinal metastasis (prophylactic lymphadenectomy). This operation was used to be and still performed through inguinal incision. However, there is a high morbidity in open inguinal lymph node dissection. Dissected skin flap to access the inguinal lymph nodes, develops skin necrosis. Local infection is very common. Depending on the extension of the lymphadenectomy, higher frequency of lymphocele, lymphedema, and lymphorrhrea is seen. These complications are seen in up to 30–50% of patients.\(^{[1]}\) An endoscopic procedure, with small incisions away from the dissecting area, seems to be a new and attractive approach, duplicating the standards of open procedure with minimal morbidity.\(^{[2]}\) We describe perioperative outcome with video endoscopic inguinal lymphadenectomy (VEIL) in patients with squamous cell carcinoma of the penis.

MATERIALS AND METHODS

It is a prospective analysis of data of patients that underwent VEIL, by a single surgeon, from 2008 to 2015. About 14 patients of penile carcinoma were suitable for VEIL technique were included in this study and followed. Three patients of anaplastic squamous cell carcinoma and two patients of moderately differentiated squamous cell carcinoma with lymphovascular invasion underwent bilateral prophylactic VEIL. Each side was operated at an interval of 6 weeks. Remaining nine patients underwent unilateral VEIL on the side of the palpable inguinal lymph node. Out of these nine patients, three patients had a positive lymph node on histology. These three patients underwent VEIL on opposite side, subsequent histology came negative [Table 1]. Data analyzed included mean operative time, mean lymph node yield, intraoperative complications, cutaneous complication, lymph–related complications, and surgical emphysema.

Surgical technique of video endoscopic inguinal lymphadenectomy

All patients were thoroughly investigated preoperatively and optimized. All were given preoperative antibiotics 1 h before starting the procedure. The aim of our approach was to remove all the inguinal lymph nodes. All patients were given epidural block anesthesia. Surface marking: Markings were done for femoral triangle, inguinal ligament, anterior superior iliac spine, and saphenofemoral junction. Patient positioning: The lower limb was folded at knee and thigh externally rotated to make the femoral triangle more prominent. It was fixed to the table. The video monitor was positioned at the contralateral side at the level of patient’s pelvic waist. Port placement and gas insufflation: An incision of 1.5 cm in the skin and in the subcutaneous tissue was made 2 cm distal to the femoral triangle vertex. A plane developed deep to Scarpa’s fascia with trocar and balloon dilatation. Thirty-degree camera was introduced through this 10 mm port, and CO\(_2\) gas insufflation was done at 14 mmHg to create the space. Further 10 mm and 5 mm ports were inserted under vision. Second port was inserted through

Table 1: Preoperative and operative details of patients

| Age | Histology                  | Clinical lymph node | U/L or B/L VEIL | Operative time in minutes | LN yield | Positive LN on histology |
|-----|----------------------------|---------------------|-----------------|---------------------------|----------|-------------------------|
| 45  | Anaplastic                 | Nil                 | B/L             | 182+190                   | 5+7      | 2+2 (right + left) pelvic lymphadenectomy subsequently) |
| 53  | Anaplastic                 | Nil                 | B/L             | 185+178                   | 7+7      | 1+1 (right + left) pelvic lymphadenectomy subsequently) |
| 48  | Moderately differentiated with LV invasion | Nil | B/L | 192+200 | 5+5 | 0+0 |
| 70  | Moderately differentiated with LV invasion | Nil | B/L | 181+210 | 6+7 | 0+0 |
| 64  | Moderately differentiated left side | Nil | B/L | 207+190 | 9+5 | 1+1 (right + left) pelvic lymphadenopathy subsequently) |
| 63  | Moderately differentiated right side | Left | Left VEIL then right | 210+197 | 11+9 (left → right) | 1+0 (underwent VEIL on left then on right side subsequently) |
| 52  | Moderately differentiated right side | Right | Right VEIL then right | 205+190 | 7+8 (right → left) | 1+0 (underwent VEIL on right then on left side subsequently) |
| 56  | Moderately differentiated right side | Right | Right VEIL | 198 | 7 | 0 |
| 63  | Moderately differentiated right side | Left | Left VEIL | 194 | 9 | 0 |
| 68  | Well-differentiated left side | Left | Left VEIL | 185 | 9 | 0 |
| 60  | Well-differentiated left side | Left | Left VEIL | 203 | 11 | 0 |
| 55  | Well-differentiated left side | Left | Left VEIL | 205 | 11 | 0 |
| 59  | Well-differentiated right side | Right | Right VEIL then left | 190+200 | 9+7 (right → left) | 1+0 (underwent VEIL on right side then on left side subsequently) |
| 54  | Well-differentiated right side | Right | Right VEIL | 195 | 8 | 0 |

LV: Lymphovascular, VEIL: Video endoscopic inguinal lymphadenectomy, B/L: Bilateral, U/L: Unilateral, LN: Lymph node
a 1 cm incision at around 2 cm above and 6 cm medially to the first incision for a 10 mm port. A third 5 mm incision for 5 mm port made laterally in symmetrical position on the opposite side for using graspers, scissors, etc. [2]

Dissection and identification of landmarks
The dissection was carried out deep to the Scarpa’s fascia and superiorly. The main landmarks of dissection were medially, the adductor longus muscle, laterally - the Sartorius muscle, superiorly - the external oblique aponeurosis and inguinal ligament, and the inferior margin were the apex of the femoral triangle. Transillumination, external pressure on the skin by palpation and surface markings allow good orientation and monitoring of the progression of the dissection. The dissection was done with the help of harmonic scalpel in all cases. Identification of the important structures: The saphenous vein was identified medially, and the external oblique aponeurosis and inguinal ligament were dissected superomedially. The identified saphenous vein was dissected cranially up to the fossa ovalis. We did not divide saphenous vein into ten patients. In four patients, saphenous vein has to be divided. Dissection was started initially at the vertex of the femoral triangle. All the fatty and lymphatic tissue above the fascia covering the muscle was dissected. It was carried superiorly along the saphenous vein until femoral vessels were reached. The tributaries of saphenous vein were identified and ligated with the help of harmonic and vascular clips. The femoral artery was identified at femoral triangle. Transillumination, external pressure on the skin by palpation and surface markings allow good orientation and monitoring of the progression of the dissection. The dissection was completed, and specimen consisted of all the fibrofatty tissue with deep and superficial inguinal lymph nodes. The specimen was taken out through the 10 mm port. Incision was extended for larger specimen and retrieval bag was used for specimen removal. Suction drain was placed through the lateral port and port incisions were closed. Compression dressing was applied. Elastic compression bandage was applied on the side of surgery. Catheter was kept for 2 days in all patients for urinary drainage. Early mobilization of the patient was done.

RESULTS
The mean age of patients, mean operative time for VEIL, mean lymph node yield are shown in Table 2. No intraoperative complication was experienced during series. We noted no cutaneous complications, localized lymphocele were seen in total 6 units out of 22 units (27.2%) (in 2 units needle aspiration was done single time and in 4 units repeated [2–4 times] needle aspirations were done), surgical emphysema is seen in 3 limbs (13.63%) [Table 3]. Seven units had 1 positive lymph node on histopathology. Two units had 2 positive lymph node on histopathology. Thirteen units had no lymph node positive on histopathology. Three patients underwent pelvic lymphadenectomy, histopathological examination of pelvic lymph nodes came out to be negative subsequently. There was significantly decreased overall morbidity in our study. Follow-up of 10 out of 14 patients with median of 48 months shows no recurrence. Four patients lost for follow-up.

D I S C U S S I O N
The rate of clinical palpable inguinal lymph node metastasis is 30% at the time of diagnosis of penile carcinoma. [1] Conventional open inguinal lymphadenectomy can have significant morbidity. [1, 3] Even today, many centers have higher complication rates with significant operative morbidity, even in the most experienced hands for open inguinal lymphadenectomy. 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, and lymphocele requiring drainage) occur in one-third. [1, 3-4] Inguinal lymphadenectomy was modified to minimize the complication of open surgery by:

| Serial number | Skin-related complications | Lymph-related complications | Self-resolving surgical emphysema |
|---------------|---------------------------|----------------------------|----------------------------------|
| 1 (B/L VEIL)  | Absent                    | Lymphocele in one unit     | Absent                           |
| 2 (B/L VEIL)  | Absent                    | Absent                     | Absent                           |
| 3 (B/L VEIL)  | Absent                    | Absent                     | Absent                           |
| 4 (B/L VEIL)  | Absent                    | Absent                     | Absent                           |
| 5 (B/L VEIL)  | Absent                    | Lymphocele in one unit     | Absent                           |
| 6 (left then right VEIL) | Absent | Absent | Absent |
| 7 (right then left VEIL) | Absent | Absent | Absent |
| 8 (U/L VEIL)  | Absent                    | Absent                     | Present                          |
| 9 (U/L VEIL)  | Absent                    | Lymphocele                 | Absent                           |
| 10 (U/L VEIL) | Absent                    | Absent                     | Absent                           |
| 11 (U/L VEIL) | Absent                    | Lymphocele                 | Absent                           |
| 12 (U/L VEIL) | Absent                    | Absent                     | Absent                           |
| 13 (right then left VEIL) | Absent | Absent | Absent |
| 14 (U/L VEIL) | Absent                    | Absent                     | Absent                           |

VEIL: Video endoscopic inguinal lymphadenectomy, B/L: Bilateral, U/L: Unilateral, LN: Lymph node
There are few reports in the literature of robotic-assisted video endoscopic inguinal node dissection. Josephson et al. in 2009 performed endoscopic robotic-assisted inguinal lymph node dissection in a patient with penile cancer;[11] Dogra et al. published their experience with two cases of robotic-assisted inguinal node dissection in patients with carcinoma of the penis in 2011.[12] All these and our study show that good results are reproducible with expertise in VEIL technique. Therefore, VEIL should replace open inguinal lymphadenectomy as the standard care of treatment.

Other possible clinical indications for this new procedure may include prophylactic dissection for urethral and vulval cancers.

**CONCLUSIONS**

In our initial experience, VEIL is a safe, feasible, and promising technique in patients with penile carcinoma who require radical inguinal lymphadenectomy. It allows the removal of inguinal lymph nodes within the same limits as in the conventional inguinal lymphadenectomy and significantly reduces surgical morbidity. Considering the available studies and our study, VEIL should become the primary line of treatment for penile cancer-related inguinal node surgical treatment, instead of open inguinal lymphadenectomy.

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**Conflicts of interest**

There are no conflicts of interest.

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