

Video-endoscopic Inguinal Lymphadenectomy

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Abstract

Penile carcinoma is a rare malignant disease with a significantly higher incidence in some areas of underdeveloped countries. Inguinal nodal involvement is found in 20–40% of cases at diagnosis and nodal metastasis is an important predictive factor for survival. Although recent data demonstrated a survival benefit with immediate resection of clinically occult lymph-node metastases, surgical morbidity is still high. Video-endoscopic inguinal lymphadenectomy (VEIL) was described in the clinical arena six years ago to duplicate the open template, reducing morbidity without compromising oncological control. All technical variations described for open surgery were safe and feasible using the endoscopic approach. In terms of reproducibility, preliminary results of a worldwide survey identified that 11 centres were already performing VEIL. Reduced morbidity and good midterm oncological results are important arguments for growing acceptance of this new minimally invasive option to manage inguinal lymph nodes in high-risk penile cancer patients.

Keywords

Penile cancer, inguinal lymphadenectomy, laparoscopy, endoscopic procedures, surgery

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Penile cancer is a rare disease in developed countries, but a recent epidemiological study showed that in some areas of Brazil this neoplasm is the second most common cause of malignant disease in men.¹ After local invasion, inguinal lymph nodes are the first place prone to dissemination. In patients with impalpable nodes, 20–30% already have asymptomatic metastasis.²

When the dissemination is still at the inguinal nodes, the disease is potentially curable by radical inguinal surgery.³ Untreated lymphonodal disease is either an important cause of morbidity or an important predictive factor for cancer-specific and overall survival.^{2,3} Despite the surgical benefits of prophylactic inguinal dissection at the time of diagnosis,^{4,5} contemporary series show that extended inguinal lymphadenectomy surgical morbidity is more than 50%.^{6,7} Over the last 20 years some alternatives have been proposed in an attempt to reduce surgical morbidity after inguinal lymphadenectomy based on limited lymph-node templates.^{8–10} Although potentially less invasive, these options have some drawbacks concerning cancer control, and inguinal recurrence ranging from 5 to 15% at follow-up occurred with all of these techniques.^{11–13} Video-endoscopic inguinal lymphadenectomy (VEIL) was first described in the clinical arena six years ago to duplicate the open template, reducing morbidity without compromising oncological control.¹⁴

Historical Aspects of the Development of Video-endoscopic Inguinal Lymphadenectomy

The concept of endoscopic inguinal dissection was proposed by Bishoff et al., who showed its feasibility by dissecting two cadaveric

models in 2003.^{15–17} These authors attempted to operate on a patient, but they did not complete the operation due to lymph-node fixation to femoral vessels preventing a safe resection. Based on this report, our initial protocol did not include patients with palpable inguinal lymph nodes. VEIL was also based on other endoscopic surgeries described in cardiovascular,¹⁸ plastic¹⁹ and gynaecological surgery.²⁰ After some modifications to Bishoff's procedure, the first case in a clinical scenario was successfully operated on at ABC Medical School in São Paulo, Brazil in 2003.^{14,21}

Our first study protocol was designed to test the feasibility of lymph-node resection and to evaluate surgical morbidity.²² Between 2003 and 2005, 10 patients were prospectively included in this study. They were diagnosed with penile carcinoma with no clinical inguinal lymphatic dissemination at the time of diagnosis.

All patients had high-risk pathological factors for inguinal dissemination such as pathological stage >pT1, histological grade >1 or microvascular or lymphatic embolisation.^{2,15} Patients underwent previous penectomy and, one month after the initial surgery, were selected for the inguinal procedure based on the pathology diagnosis of the specimen. The patients underwent bilateral inguinal lymphadenectomy following our protocol:

- classic open inguinal lymphadenectomy on one leg (standard procedure); or
- VEIL on the other leg (study group).

Comparison of VEIL with the open procedure in this preliminary study showed a reduced overall complication rate (20 and 70%, respectively), especially related to skin events. The same number of nodes was removed with each approach.

A second study was designed to test whether VEIL could promote the advantages related to minimally invasive procedures.²³ The results of this study suggested that a reduced hospital stay and a faster recovery could be achieved in more than six patients when bilateral VEIL was applied. The feasibility of VEIL in N1 patients was additionally proved. There was no recurrence over a mean follow-up of 36 months.

Technical Aspects

Conventional Video-endoscopic Inguinal Lymphadenectomy (Superficial and Deep Inguinal Dissection)^{17,21}

Patient Positioning and Inferior Member Preparation

The patient was positioned in supine position with thigh abduction. The video system was placed on the opposite side to the abducted thigh, next to the patient's waist.

Initial Access and Surgical Team Positioning

A 1.5cm incision was made 2cm distally to the lower vertex of the femoral triangle. Scissors and digital manoeuvres were used to develop a plane of dissection deep into Scarpa's fascia. A second 1.0cm incision was made 6cm medially to the apex of the triangle, after digital elevation of the skin through the first incision, to place a 10mm trocar. The last 5mm port was placed 6cm laterally to the apex of the triangle in an analogous manner. A 10mm Hasson trocar was inserted in the first incision. The first port accommodates 0° optics. The medial port accepts the harmonic scalpel or the clip applier and the lateral port may accept the grasper, scissors or a dissection device (see *Figure 1*). Surgeons were positioned laterally to the patient's leg and the surgery can be performed ergonomically.

Gas Insufflation

The working space was insufflated with CO₂ at 15mmHg with quick space distention, and CO₂ pressure could be kept as low as 5mmHg for the duration of the procedure. Transillumination allows good orientation and monitoring of the progression of the dissection area towards the cavity.

Retrograde Dissection and Identification of Anatomical Limits

It is imperative that the dissection be carried out with a harmonic scalpel in a correct plane deep to Scarpa's fascia until the external oblique fascia is achieved, so that all lymphatic superficial tissue can be removed (see *Figure 2*). The main landmarks – the adductor longus muscle medially, the sartorius muscle laterally and the inguinal ligament superiorly – are clearly visualised (see *Figure 3*).

At this point we identify the saphenous vein medially and the spermatic cord and the external inguinal ring superomedially. The femoral nerve branches, which can be preserved, present laterally.

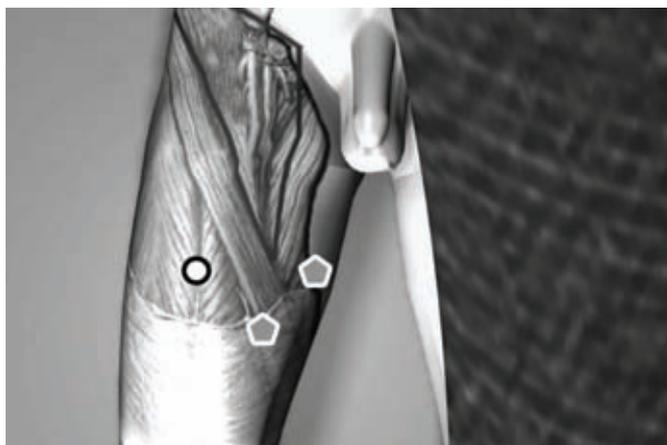
Identification and Dissection of the Saphenous Vein

The saphenous vein is dissected cranially up to the fossa ovalis.

Femoral Artery Identification at the Femoral Triangle

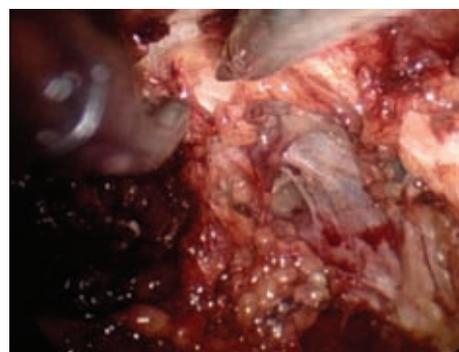
This is the lateral edge of the dissection limit. At this point it is recommended to open the muscular fascia in all its extension.

Figure 1: Disposition of Trocars in Right Thigh for Video-endoscopic Inguinal Lymphadenectomy



Pentagons represent 10mm trocars; circle represents 5mm trocar.

Figure 2: Dissection of the Correctly Plane



Dissection of the correctly plane is made with a harmonic scalpel, and maintained scarpa's fascia is adhered to the skin to prevent ischaemia.

Distal Lymphatic Tissue Ligation at the Femoral Triangle Vertex

The tissue is dissected with a harmonic scalpel and final control is obtained using clips.

The following steps are then undertaken:

- Lymphatic tissue dissection reaches the femoral vessels above the femoral ring.
- Distal saphenous ligation with metallic or polymeric clips.
- Control of saphenous branches with a harmonic scalpel or clips and proximal ligation of the saphenous vein at the femoral vein with metallic or polymeric clips.
- End of dissection, liberating the specimen after ligation of the proximal portion of the lymphatic tissue at the deep portion of the femoral channel (see *Figure 4*).
- Specimen removal through the first 15mm incision. If the specimen is larger, the incision can be enlarged, usually by 20–25mm.
- Suction drainage at the 5mm port incision.
- Suture of incisions (10–20mm).
- Peri-operative care and follow-up.

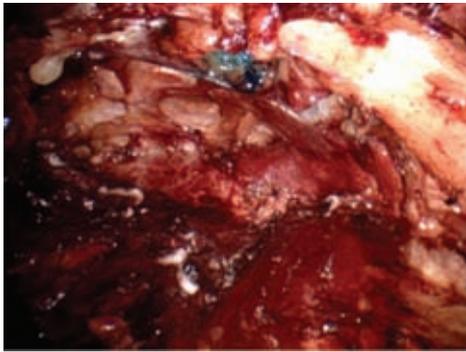
Prophylactic intravenous cefalotin was administered routinely. In the post-operative period, patients were stimulated to early ambulation and none received anticoagulants. Oral intake was started 12 hours after the procedure. The suction drain was removed when output less than 50ml.

Figure 3: Boundaries of the Femoral Triangle



Inguinal ligament superiorly, medial border of sartorius muscle laterally and lateral border of adductor longus muscle medially.

Figure 4: Inspection After Lymphadenectomy



Inspection after lymphadenectomy confirmed complete removal of superficial and deep lymph nodes within dissection template.

Conventional Video-endoscopic Inguinal Lymphadenectomy with Saphenous Vein Preservation

The dissection must spare the saphenous vein, and the lymph nodes are resected in two blocks (lateral and medial). Sometimes it is possible to identify both the major and accessory saphenous veins and preserve both. Deep dissection was performed without further problems or limitations.

Simplified Video-endoscopic Inguinal Lymphadenectomy (Catalona's Template) and Frozen Section

Some authors prefer to dissect only lymph nodes that are medial to the saphenous and perform a frozen section. In cases where pathological examination was positive for malignancy, an extended template was amplified. Sotelo et al. showed that simplified dissection could be performed 30 minutes more quickly than radical dissection.²⁵ It is important to stress that some reports derived from open surgery consider simplified dissection unreliable due to a late recurrence rate of 15%.¹³

Superficial Video-endoscopic Inguinal Lymphadenectomy

Based on the cost-benefit ratio, some authors consider open superficial dissection the gold standard of care.^{26,27} In the endoscopic

technique, this is the first step of conventional VEIL without the dissection of deep nodes of the femoral channel.²⁸ The position of superficial lymph nodes can be localised by sonography and their projection marked with black ink to enable easier resection during surgery. Frozen section can be carried out as performed after simplified dissection.²⁵

Bilateral Video-endoscopic Inguinal Lymphadenectomy

An initial study in five patients suggested that all the advantages of video-endoscopic surgery can be obtained using this approach.²³ The mean operative time was 4.5 hours. Mean hospital stay was 24 hours (range 12–36 hours). Mean time to drainage withdrawal was five days (range three to seven days). Mean time to recovery to normal activities was 14 days (range seven to 18 days).

Robotic Video-endoscopic Inguinal Lymphadenectomy

The first two dissections in two steps in the same patient were recently described by Josephson et al.²⁹ These authors performed surgery with da Vinci assistance (three ports) and one port for suction with clipping by the assistant. The authors reported similar results to previous publications with conventional VEIL.

The ergonomic position of the surgeon and the flexibility of manoeuvres are the great advantages of this new technique. The disadvantages include the costs and the lack of availability in most centres that treat penile cancer.³⁰

Aspects of the Learning Curve

Open inguinal lymphadenectomy is not a routine operation for most urologists. On initial assessment, VEIL seems to be a difficult technique. The working space is small but familiar to surgeons who work with extraperitoneal endoscopic access; conversely, open principles such as maintenance of a good thickness of skin flap, identification of anatomical parameters and resection of all lymphatic tissue of this region seem to be achieved after a few procedures for a surgeon with experience in open lymphadenectomy and endoscopic techniques.³¹

Operative time is greater at the beginning of the learning curve compared with the open procedure, but we believe that it will soon decrease. In our experience, comparing the first 10 and the last 12 procedures there was a small reduction in mean operative time (from 120 to 105 minutes), but there were no differences in complication rate. The mean number of resected nodes becomes slightly higher with experience.

Comments and Future Directions

There are some controversial issues concerning prophylactic inguinal lymphadenectomy in patients with penile cancer. Some authors have published data on the advantages of immediate lymphadenectomy,⁴ while others recommend a watchful, waiting policy and salvage surgery when the inguinal lymph nodes become clinically positive.³²

Although the survival benefits when performing lymphadenectomy in patients with impalpable lymph nodes have been demonstrated, surgical morbidity is still high.^{3,5,6,32} This conventional surgery is frequently performed with a large inguinal incision and can present

skin complications such as skin necrosis and wound infection. Depending on the extension of node resection, leg and thigh chronic lymphoedema, lymphorrhoea and lymphocele can occur. More recent publications suggest that the application of some intra- and post-operative measures can partially decrease the complication rates.⁷

During the last two decades, the management of penile carcinoma patients with impalpable regional lymph nodes has improved, making the procedure considerably less morbid than before. There are some reasons to explain these improvements: the selection of patients has improved and surgery has been avoided in patients with a low risk of lymphatic disease;^{2,15} additionally, some authors perform a limited area of dissection with preservation of the saphenous vein.⁸⁻¹¹ Although their morbidity has decreased, all of these techniques failed to reach optimal oncological control.

More recently, D'Ancona and colleagues reported fewer complications with a simplified staged lymphadenectomy compared with the radical dissection. On the other hand, 5.5% of patients with negative simplified dissection had inguinal disease during the follow-up.⁹

Another strategy that has been accepted worldwide is the use of lymphoscintigraphy to attempt to detect the functional sentinel lymph node.¹⁰ Despite the excellent results in terms of reduction of surgical morbidity, Kroogan and colleagues recently showed that this kind of procedure had a rate of late inguinal recurrence, which can possibly compromise a patient's prognosis, of 15%.¹²

The description of the use of laparoscopic techniques for pelvic and retroperitoneal lymphadenectomies in urological malignancies, including prostate, bladder, penile and testicular cancers, dates from 15 years ago.³³ VEIL is a procedure in its infancy. The initial purpose was to offer a radical surgery with lower morbidity.

Other technical variations have proved feasible and the choice is dependent on surgeon preference.^{24,25,28,29} open superficial dissection has been proposed by some groups as standard,^{26,27} the endoscopic approach can reproduce open surgery with fewer skin complications²⁸ and the saphenous vein can be preserved as some authors claim that it may reduce post-operative oedema.^{8,9,24,25}

For those who recommend simplified dissection with intraoperative frozen section biopsy,⁹ the endoscopic technique can also be applied with even more post-operative benefits in the positive-lymph-node patients who receive radical surgery.^{25,34}

Concerning the complications, actual results are encouraging, suggesting that this technique has the potential to reduce post-operative morbidity. The most important advantage of VEIL seems to be a decrease in skin events.

We believe that the reduction of morbidity may be explained by the fulfilment of the following principles:

- minimal avoidance of mechanical retraction and use of electrocautery;
- small incisions, allowing better preservation of the skin's blood supply and lymphatic drainage;

Table 1: Worldwide Experience of Video-endoscopic Inguinal Lymphadenectomy

| Case Series | Cutaneous Morbidity (%) | Lymphatic Morbidity (%) | Overall Morbidity (%) |
|--|-------------------------|-------------------------|-----------------------|
| Tobias-Machado et al., 2009 20 cases/30 legs | 5 | 10 | 15 |
| Sotelo et al., 2007 8 cases/14 legs | 0 | 23 | 23 |
| Romanelli and Nishimoto, 2009 9 cases/16 legs | 12 | 12 | 24 |
| Thyavihaly et al., 2009 16 cases/16 legs | 6 | 19 | 25 |
| Master et al., 2009 16 cases/25 legs | 12 | 0 | 12 |
| Suárez et al., 2009 8 cases/11 legs | 0 | 30 | 30 |

- incisions away from the great vessels, which makes a sartorius muscle flap rotation unnecessary; and
- identification of small lymphatic vessels under magnification and their control with harmonic scalpel and control of bigger branches with clips are imperative steps to minimise lymphatic leakage and lymphocele formation.

Hypercarbia can occur, but it is easily managed with hyperventilation and hyperhydration, without any clinical repercussions. Post-operative pain seemed lower with endoscopic surgery. Patient subjective preferences confirm that VEIL is an attractive minimally invasive technique.

The measurement of the larger incision in VEIL was 2.5cm compared with 10cm for the open surgery. Due to the small dimension of the incisions, intradermic suture can be completed with a better aesthetic outcome. The benefit regarding quick discharge was obtained with bilateral surgery;^{23,25} the smaller drain output of the endoscopic procedure allows us to remove the drain sooner, which means the patient can be discharged earlier.²³

The similar number of nodes removed in both sides from the same patient is an indirect sign that VEIL can be as effective as the open approach. Our follow-up is still ongoing for evaluation of oncological control, but the lack of recurrence and port implants including patients with positive nodes is encouraging.²³

Some reports from experts have considered VEIL as an interesting approach.³⁵⁻³⁸ In terms of reproducibility, the preliminary results of an ongoing worldwide survey identified 11 centres (six in Brazil, one in Venezuela, one in Uruguay, one in the US and two in India) where VEIL was applied (see *Table 1*). The overall results concerning morbidity and oncological control seem to be similar.^{23-25,29,39-42}

Thyavihally et al. operated on 16 patients for bilateral inguinal lymphadenectomy (one side open and the other side video-endoscopic), with lower skin and lymphatic complication in the VEIL side.⁴⁰ Master et al. performed 25 endoscopic groin dissections with a cutaneous complication rate of 12% and no lymphatic morbidity.⁴¹

New frontiers for the future include new imaging methods to localise metastasis, nanoparticle magnetic resonance imaging (MRI), artefacts

for better endoscopic identification of nodes, techniques to reduce lymphatic events, and robotic surgery. Reduction of the learning curve and ergonomic issues are the most important advantages of robotic technology.

Conclusion

VEIL is a safe and feasible technique for patients with penile carcinoma. VEIL allows a decrease in post-operative morbidity without compromising oncological control. Based on the data available in the literature, VEIL has the potential to become the chosen minimally invasive procedure for prophylactic inguinal lymphadenectomy in patients with penile cancer. New reports with more patients and a longer follow-up will be necessary to define the real value of this new technique in the modern urological oncology armamentarium. ■



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- Favorito LA, Nardi AC, Ronalsa M, et al., Epidemiologic study on penile cancer in Brazil, *Int Braz J Urol*, 2008;34:587-91.
- Ficarra V, Zattoni F, Cunico SC, et al., Gruppo Uro-Oncologico del Nord Est (Northeast Uro-Oncological Group) Penile Cancer Project. Lymphatic and vascular embolizations are independent predictive variables of inguinal lymph node involvement in patients with squamous cell carcinoma of the penis: Gruppo Uro-Oncologico del Nord Est (Northeast Uro-Oncological Group) Penile Cancer data base data, *Cancer*, 2005;103(12):2507-16.
- Ornellas AA, Correia Seixas AL, Marota A, et al., Surgical treatment of invasive squamous cell carcinoma of the penis: retrospective analysis of 350 cases, *J Urol*, 1994;151:1244-9.
- Kroon BK, Horenblas S, Lont AP, et al., Patients with penile carcinoma benefit from immediate resection of clinically occult lymph node metastases, *J Urol*, 2005;173(3):816-19.
- Abi-Aad AS, deKernion JB, Controversies in ilioinguinal lymphadenectomy for cancer of the penis, *Urol Clin North Am*, 1992;19:319.
- Bevan-Thomas R, Slaton JW, Pettaway CA, Contemporary morbidity from lymphadenectomy for penile squamous cell carcinoma: the M.D. Anderson Cancer Center experience, *J Urol*, 2002;167:1638.
- Nelson BA, Cookson MS, Smith JA Jr, Chang SS, Complications of inguinal and pelvic lymphadenectomy for squamous cell carcinoma of the penis: a contemporary series, *J Urol*, 2004;172(2):494-7.
- Catalona WJ, Modified inguinal lymphadenectomy for carcinoma of the penis with preservation of saphenous veins: technique and preliminary results, *J Urol*, 1988;140:306.
- d'Ancona CA, de Lucena RG, Querne FA, et al., Long-term followup of penile carcinoma treated with penectomy and bilateral modified inguinal lymphadenectomy, *J Urol*, 2004;72(2):498-501.
- Lont AP, Horenblas S, Tanis PJ, et al., Management of clinically node negative penile carcinoma: improved survival after the introduction of dynamic sentinel node biopsy, *J Urol*, 2003;170:783.
- Lopes A, Rossi BM, Fonseca FP, Morini S, Unreliability of modified inguinal lymphadenectomy for clinical staging of penile carcinoma, *Cancer*, 1996;77:2099.
- Kroon BK, Lont AP, Valdes Olmos RA, - Morbidity of dynamic sentinel node biopsy in penile carcinoma, *J Urol*, 2005;173(3):813-15.
- Bishoff JA, Lackland AFB, Basler JW, et al., Endoscopy subcutaneous modified inguinal lymph node dissection (ESMIL) for squamous cell carcinoma of the penis, *J Urol*, 2003;169(4):78.
- Machado MT, Molina Jr WR, Tavares A, et al., Comparative study between videoendoscopic inguinal lymphadenectomy (VEIL) and standard open procedure for penile cancer: preliminary surgical and oncological results, *J Urol*, 2005;173(4):226.
- Slaton JW, Morgenstern N, Levy DA, et al., Tumor stage, vascular invasion and the percentage of poorly differentiated cancer: independent prognosticators for inguinal lymph node metastasis in penile squamous cancer, *J Urol*, 2001;165:1138.
- Theodorescu D, Russo P, Zhang ZF, et al., Outcomes of initial surveillance of invasive squamous cell carcinoma of the penis and negative nodes, *J Urol*, 1996;155:1626.
- Schuessler WW, Vancaille TG, Reich H, Griffith DP, Transperitoneal endosurgical lymphadenectomy in patients with localized prostate cancer, *J Urol*, 1991;145:988-93.
- Folliguet TA, Le Bret E, Moneta A, et al., Endoscopic saphenous vein harvesting versus 'open' technique. A prospective study, *Eur J Cardiothorac Surg*, 1998;13(6):662-6.
- Dardour JC, Ktorza T, Endoscopic deep periorbital lifting: study and results based on 50 consecutive cases, *Aesthetic Plast Surg*, 2000;24(4):292-8.
- Avrahami R, Nudelman I, Watenberg S, et al., Minimally invasive surgery for axillary dissection. Cadaveric feasibility study, *Surg Endosc*, 1998;12(5):466-8.
- Machado MT, Molina Jr WR, Tavares A, et al., Comparative study between videoendoscopic inguinal lymphadenectomy (VEIL) and standard open procedure for penile cancer: preliminary surgical and oncological results, *J Urol*, 2005;173:226.
- Tobias-Machado M, Tavares A, Ornellas AA, et al., Video endoscopic inguinal lymphadenectomy: a new minimally invasive procedure for radical management of inguinal nodes in patients with penile squamous cell carcinoma, *J Urol*, 2007;177:953-8.
- Tobias-Machado M, Tavares A, Silva MN, et al., Can video endoscopic inguinal lymphadenectomy achieve a lower morbidity than open lymph node dissection in penile cancer patients?, *J Endourol*, 2008;22:1687-91.
- Tobias-Machado M, Tavares A, Molina Jr WR, et al., Video endoscopic inguinal lymphadenectomy (VEIL) with saphenous vein preservation: demonstration of feasibility (video), *J Endourol*, 2007;21:1.
- Sotelo R, Sánchez-Salas R, Carmona O, et al., Endoscopic lymphadenectomy for penile carcinoma, *J Endourol*, 2007;21:364-7.
- Spiess PE, Hernandez MS, Pettaway CA, Contemporary inguinal lymph node dissection: minimizing complications, *World J Urol*, 2009;27(2):205-12.
- Pompeo AC, Extended lymphadenectomy in penile cancer, *Can J Urol*, 2005;12(Suppl. 1):30-36.
- Tobias-Machado M, Reis LO, Superficial Video Endoscopic Inguinal Lymphadenectomy (VEIL) in Penile Cancer Treatment (video), 2008. Available at: www.ttmed.com/SurgicalVideoLibrary.aspx?ID_VD=mOF185VmWyc%3D
- Josephson DY, Jacobsohn KM, Link BA, Wilson TG, Robotic-assisted endoscopic inguinal lymphadenectomy, *Urology*, 2009;73:167-70.
- Tobias-Machado M, Serpa Neto A, Re: Robotic-assisted endoscopic inguinal lymphadenectomy, *Urology*, 2009;73(6):1424-5.
- Tobias-Machado M, Starling ES, Tavares A, et al., Video endoscopic inguinal lymphadenectomy: learning curve and midterm follow-up results of a new procedure, *J Urol*, 2008;179(4 Suppl.):178.
- Theodorescu D, Russo P, Zhang ZF, et al., Outcomes of initial surveillance of invasive squamous cell carcinoma of the penis and negative nodes, *J Urol*, 1996;155:1626-31.
- Schuessler WW, Vancaille TG, Reich H, Griffith DP, Transperitoneal endosurgical lymphadenectomy in patients with localized prostate cancer, *J Urol*, 1991;145:988-93.
- Tobias-Machado M, Wroclawski ER, Juliano RV, et al., Radical and staged simplified video endoscopic inguinal lymphadenectomy (VEIL): minimally invasive options to achieved reduced morbidity in penile carcinoma lymph node management, *Urology*, 2008;72:S110.
- Pow-Sang JM, Ten best readings relating to genitourinary malignancy, *Cancer Control*, 2007;14:305.
- Bastide C, Paparel P, Guillonnet B, Minimally invasive surgery in oncologic urology: a recent review, *Curr Op Urol*, 2008;18:190-97.
- McDougall E, Comment: Video endoscopic inguinal lymphadenectomy: a new minimally invasive procedure for radical management of inguinal nodes in patients with penile squamous cell carcinoma, *J Urol*, 2007;177:953-7.
- Carmignani G, Words of wisdom. Re: Video endoscopic lymphadenectomy: a new minimally invasive procedure for radical management of inguinal nodes in patients with penile squamous cell carcinoma, *Eur Urol*, 2008;53:451-2.
- Brosnan SA, Penile cancer: treatment. Available at: emedicine.medscape.com/article/446554-treatment
- Thyaviahally Y, Tongaonkar H, Video Endoscopic Inguinal Lymphadenectomy (VEIL): our initial experience, *J Urol*, 2009;72:181(4):427.
- Romanelli P, Nishimoto R, Experiencia inicial com linfadectomia inguinal endoscopica video assistida (in Portuguese), *Urologia*, 2008. Available at: www.sbu-mg.org.br
- Master V, Ogan K, Kooby D, et al., Leg endoscopic groin lymphadenectomy (LEG Procedure): step-by-step approach to a straightforward technique, *Eur Urol*, 2009;56(5):821-8.