

# Testicular Patch as Lymphatic Conduit in Canine Hind Limb

H. Hodjati\*, B. Shakeryan\*,  
N. Riaz Montazer\*\*

## Abstract

**Background:** Management of lymphedema is a challenging issue in surgery. A variety of operations have been used, albeit with little success.

**Objective:** To investigate the efficacy of testicular patch as a lymphatic conduit.

**Methods:** An incision was made on the inguinal area of 10 dogs and all lymph nodes of inguinal area were excised. The tunica albuginea and parenchyma near the hilum of testes were taken and transferred to the site of excised lymph nodes.

**Results:** Microscopic study showed neovascularization of lymphatic duct in 80% of samples.

**Conclusion:** Testicular patch graft can be used as a lymphatic conduit and implemented in the management of lymphedema.

**Iran J Med Sci 2002; 27(3):114-116**

**Keywords** • Lymphedema • testis • patch graft.

## Introduction

**L**ymphedema, the abnormal collection of lymph in the interstitial space is classified into primary and secondary types.<sup>1</sup> Procedures involving skin flaps and skin grafts have been used since the early part of the last century.<sup>2</sup> A number of procedures have been proposed to bypass or reconstruct the lymphatic system.<sup>1,3,4</sup> These include dermal flaps buried in muscle, flaps of omentum placed in the lymphedematous extremity, demucosalized segment of ileum over lymph nodes, and microsurgical lymphaticovenous anastomoses.<sup>1,5,6</sup> Clinical data and experience remain inadequate to demonstrate the efficacy of these techniques. In this study, we present an easy and simple experimental model for lymphatic conduit formation for the treatment of lymphedema.

## Materials and Methods

Ten healthy adult dogs were used. General anesthesia was induced with thiopental and maintained with oxygen and 1-3% halothane

\*Departments of Surgery, and  
\*\*Pathology, Shiraz University of  
Medical Sciences, Shiraz, Iran

**Correspondence:** H. Hodjati,  
MD, Department of Surgery,  
Shiraz University of Medical  
Sciences, Shiraz, Iran  
**Tel:** +98-711-2309563  
**E-mail:** [hodjatih@sums.ac.ir](mailto:hodjatih@sums.ac.ir)

### Testicular patch as lymphatic conduit

through an endotracheal tube. Access to the inguinal lymph nodes was gained through an inguinal incision bilaterally. Dissection of inguinal area and total excision of all lymph nodes were then performed. An elliptical incision (1.5 cm) on the tunica albuginea of testis near the hilum was made and a flap was transferred to the site of excised lymph node and fixed with 4-0 chromic catgut. All ten animals survived the procedure. After 6 months, the site of testicular patch and testis were removed and the H&E-stained sections of testicular patch and anastomotic site was investigated histologically.

### Results

#### *Histologic findings*

Histologic findings were divided in to 3 groups (Table 1).

Sections obtained from the testicular flap of group I showed a rich lymphatic vascular development. There were many lymphatic vessels of different sizes scattered in a stroma of minimal fibrosis, with arterial and venular capillaries. The lymphatic vessels showed a thin layer of endothelial cell lining. A pinkish colored homogenous lymph fluid could be observed in some of these vessels. Anastomosing type of vascular lymphatic channels could be observed in a few areas (Fig 1). Sections obtained from group II showed a moderate lymphatic vascular development. There were scattered lymphatic vessels showing compressed or slit-like pattern in a stroma with moderate fibrosis. Sections of group III showed poor lymphatic development and sparse lymphatic vessels in a stroma with dense fibrosis.

### Discussion

Several conservative treatment methods have been demonstrated to be useful in the management of lymphedema. However, lymphedema, refractory to conservative management, may require surgical treatment. Potential indications include impaired limb function, recurrent episodes of cellulitis and lymphangitis, intractable pain and lymphangiosarcoma. The underlying principle for excision aims at removing excess tissue to decrease volume of the extremity. Good reduction can be achieved with staged resection of the subcutaneous tissue, and that of the excess skin while using the remainder of skin for coverage of the wound. However, prolonged

**Table 1:** Histological findings in 3 groups.

| Groups | Number | Histologic findings        |
|--------|--------|----------------------------|
| I      | 6      | Rich lymphatic development |
| II     | 2      | Moderate lymphatic         |
| III    | 2      | Poor lymphatic development |

hospitalization, poor wound healing, long surgical scars, sensory nerve loss, residual edema of the foot and ankle and poor cosmetic results pose significant problems and prevent offering such procedures except for truly disabling lymphedema, not responding to medical measures.

Physiologic operations have been aimed at restoring lymphatic transport capacity, most frequently with lymphogenous anastomies or lymphatic grafting. Lymphogenous anastomoses operations for obstructive lymphedema have been performed for several decades, but their efficacy continues to be controversial.

Lymphatic grafting is a promising procedure, but it requires microsurgical expertise and commitment to treat this frequently frustrating and difficult disease.<sup>7</sup>

Despite advances in microsurgery, the most suitable operation for lymphedema remains unsettled. A variety of tissue transplants and artificial substances have been used to facilitate drainage of peripheral lymph. The greater omentum, for example, has absorptive lymph-draining capability, is resistant to infection, and is an expendable organ. Previous attempts to use omentum in the treatment of clinical lymphedema have, however, been disappointing.<sup>8</sup> Despite all these procedures, treatment of



**Fig 1:** Rich neovascularization of lymphatic ducts.

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lymphedema continues to be one of the unsolved clinical problems.

Testicles have a rich lymphatic drainage and there is no pressure on the cord as it passes across the inguinal canal and no significant risk of fibrosis formation hence no external pressure over the cord. We feel that the testicular patch technique can be an effective method for creation of lymphatic conduit. We did not encounter any similar report creation of lymphatic conduit.

We found rich lymphatic channel neovascularization in six samples. In 2 samples the results were moderate and in 2 samples the lymphatic channel neovascularization was poor.

Many surgical procedures have been used for the treatment of lower extremity lymphedema. We feel that the testicular patch can be used as lymphatic conduit and possibly in the management of lymphedema.

#### Acknowledgment

*This work was partially supported by the grant No. 801220 from the Deputy for Research at the Shiraz University of Medical Sciences.*

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