Staged modified Charles procedure on stage III lymphedema of lower limb: safe and effective: a case report

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ABSTRACT

Introduction: Lymphedema of lower limb or elephantiasis is debilitating condition causes quality of life impairment, physical, mental, and social burdens. Surgical techniques of lymphedema are physiologic therapy and excisional procedure, one of them is Charles procedure. Currently, surgical approach controversies remain. This case report aims to present Staged Modified Charles Procedure on stage III lymphedema of lower limb, other excisional procedure techniques.

Case description: A Male, 43 years old, complain enlargement of left leg since 18 years ago, his leg was bigger and heavier gradually with intermittent pain until he got difficult to walk. History of trauma, or previous surgery was denied. There were lymphostatic elephantiasis, non-pitting edema with skin changes (acanthosis, increase in thickness, fat deposition, and fibrosis) on physical examination. The patient was diagnosed as lymphedema stage III. Modified Charles’s procedure consisted of two-stage tissue excision, negative pressure wound therapy, and delayed skin graft. There were no fluid or blood loss, and infection, obtained 95% of skin graft take, good wound healing, and maximum soft tissue reduction. Histomorphologically supports the diagnosis of elephantiasis.

Conclusion: Staged modified Charles procedure on stage III lymphedema of lower limb are safe and effective treatment, provide maximum tissue reduction, with excellent skin graft and wound healing, without fluid and blood loss, or infection.

Keywords: lymphedema, lower limb, charles procedure.

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INTRODUCTION

Lymphedema of lower limb, is a chronic, refractory, and incurable disease of lymphatic system. Excessive tissue is debilitating condition causes quality of life impairment, lacking of psychosocial well-being, experiencing physical and functional impairment, the greater number of symptoms and higher severity of lymphedema were associated with poorer quality of life.4,5 Primary lymphedema is characterized by congenital disease of lymphatic system, while secondary lymphedema results from obstruction or destruction of normal lymphatic system, either by disease or iatrogenic process, such as filariasis or more commonly due to the various cancer treatment modalities.5,6 In filarial elephantiasis, during chronic infection of filarial, the lymphatic vessel exhibit valve dysfunction, vessel dilatation, impaired lymphatic muscle contractility and insufficient drainage. As the resultant is fluid accumulation and retrograde lymph flow associated with severe lymphedema.5 Stage III lymphedema is the advanced stage of lymphedema with clinical presentation of lymphostatic elephantiasis; non-pitting edema with skin changes (e.g., acanthosis, increase in thickness), fat deposition, and fibrosis.6

Indications for surgery include impaired limb function, recurrent episodes of cellulitis and lymphangitis, intractable pain, lymphangiosarcoma and cosmetics.7 Surgical techniques of lymphedema divided into physiologic therapy and excisional procedure. Physiologic therapy is microsurgical procedures that improve the physiologic drainage of lymphatic fluid through lymphatic venous anastomosis or lymphnode transfer. In contrast, excisional recipes such as the Homans or Charles procedures consist of radical excision of the affected tissue, followed by skin graft coverage.8 Physiologic therapy benefits in early stage of lymphedema where the lymphatics are relatively healthy and the tissues are still soft and pliable. Simultaneously, excisional procedure remains the mainstay and the procedure of choice management for patients with advanced-stage lymphedema and patients with large-volume progressive fibrotic disease, because of physiologic therapies, may not provide sufficient volume reduction.3,4,8

The Charles procedure involves excision of the skin, subcutaneous tissue and deep fascia of the legs and skin grafting the raw areas on the bare exposed muscle in single-stage.9 Modified Charles procedure is the Charles procedure was modified by delaying skin grafting
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until the wounds had been treated with a negative pressure dressing for 1 week after the initial surgery. Although some authors have reported favorable results, however this procedure is invasive and may result major complications such as significant fluid and blood loss requiring blood transfusion, infection, skin graft failure, and wound healing. Severe wound healing complications may, in some cases, even worsen lymphedema necessitating amputation.

In the present study, we present an innovation surgical technique called Staged Modified Charles Procedure, on stage III lymphedema of lower limb consisting of two-stage excessive tissue excision, negative pressure wound therapy (NPWT), and delayed skin grafting of raw area on the bare exposed muscle. The purpose of this case report is to demonstrate the results of Staged Modified Charles procedure in attempt to avoid major complications of surgery.

CASE DESCRIPTION

A Male, 43 years old, complain enlargement of left leg since 18 years ago, his leg was bigger and heavier gradually with intermittent pain until he got difficult to walk. History of trauma or previous surgery was denied. On physical examination there were lymphostatic elephantiasis, non-pitting edema with skin changes (acanthosis, increase in thickness, fat deposition, and fibrosis) (Figure 1). Laboratory and chest x-ray within normal limit. According to International Society of Lymphology Staging System, the patient was diagnosed as lymphedema stage III based on clinical presentation. Modified Charles procedure was performed in two stages of soft tissue excision. The first stage was performed for partial soft tissue excision (Figure 2), and then the second stage was continued on next 7 days for complete soft tissue excision (Figure 3). The wound operation was covered by negative pressure wound therapy (Figure 4). A delayed skin graft was performed on three weeks after adequate tissue granulation (Figure 5). Evaluation on next 19 days after skin grafting, 95% of skin graft take, good wound healing, and maximum soft tissue reduction (Figure 6). Histomorphologically supports elephantiasis diagnosis with microscopic finding of stroma fibro-collagen tissue oedematous, epidermal hyperkeratosis, dilated lymphatic vessels, and appear aggregates of lymphocytes and plasma cells around it.
DISCUSSION

Surgical techniques of lymphedema divided into physiologic therapy and excisional procedure. Physiologic therapy is microsurgical procedures that improve the physiologic drainage of lymphatic fluid through lymphatic venous anastomosis or lymphnode transfer. In contrast, excisional procedures such as the Homans or Charles procedures consist of radical excision of the affected tissue, followed by skin graft coverage. Currently, there is no curative treatment for lymphedema, although advances in microsurgical technique, surgical approach to lymphedema controversies remain. Surgical treatment of lymphedema is patient-specific, safe, and efficacious.

Excisional procedures remain the mainstay and the procedure of choice management for patients with advanced-stage or stage III lymphedema or patients with bulky and large-volume advanced fibrotic disease, because this procedure may provide sufficient volume reduction, Charles procedure is one of them. Charles procedure is skin and subcutaneous tissues were excised circumferentially to the deep fascia level and the resultant wound repaired using a split-thickness or full-thickness skin graft. Reductive techniques such as direct excision aim to remove fibrofatty tissue that has been generated as a consequence of sustained lymphatic fluid stasis. Charles procedure generally understood the radical circumferential excision of lymphoedematous tissue down to fascia and immediate resurfacing with a split-thickness skin graft. Therefore advantages of Charles procedure are risk of surgical site complications such as infection, wound dehiscence, significant fluid shifts and blood loss, wound infection, moreover amputation because of exophytic changes within the grafted skin, chronic cellulitis and skin breakdown. Severe wound healing complications may, in some cases even worsen lymphedema necessitating amputation. Some of those reports mention unpredictable and poor results, the Charles procedure is often criticized and be warned as option of treatment of lymphedema. The author’s opinion is those complications associated with surgery are carried out in one stage. Therefore we perform it in several stages to minimized surgical complications in this present study.

Although Charles’s advantages are removed fibrofatty tissue and effective for severe lower extremity lymphedema, with excellent functional result, no recurrence of lymphedema. In order to reduce surgical complications of Charles’s procedure, it appears that several modifications of surgical technique have been made. The Charles procedure was modified by delaying skin grafting until the wounds had been treated with a negative pressure dressing for 1 week after the initial surgery, with minor complication blood loss requiring transfusion, improvement in quality of life, complete wound healing, without recurrence. Other modified of Charles procedures are modified Charles procedure combine with lymphovenous anastomosis and transferred lymph node flap, with maximum reduction of the lymphedema without major complication and recurrence. The new technique which is a modified form of the Homans (staged subcutaneous excision beneath flaps in two or sometimes four stages, was excellent outcome, the most common complication was wound seroma.

In this present study, through Staged Modified Charles Procedure where tissue excision is performed in 2 stages, we found some benefits. During 2 stages of excision (the second stage excision was performed on next 7 days after the first excision), no fluid and blood loss requires blood transfusion, and no infection was found. The wound was managed by negative pressure wound therapy, it is important to preparing tissue granulation, and then skin graft was performed on next 3 weeks after the second stage excision. The Final result indicates maximum tissue reduction with good wound healing, with 95% skin graft take, we argue that Staged Modified Charles Procedure on stage III lymphedema of lower limb is effective and safe of treatment.
CONCLUSION
Stage III lymphedema of lower limb is debilitating condition causes quality of life impairment, physical, mental, and social burdens to the patient. Soft tissue reduction is required as surgical option. Excisional operations with Staged Modified Charles Procedure was safe and effective treatment, provide maximum tissue reduction, with good wound healing and excellent skin graft, without fluid and blood loss, or infection.

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CONFLICT OF INTEREST
All authors declared that there are no conflicts of interest.

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AUTHOR CONTRIBUTION
All of the authors equally contributed to the study from the conceptual framework, data gathering, until reporting the study's content.

ETHICAL CONSIDERATION
Patients had received signed written informed consent regarding publication of their medical data in medical journals prior to any data collection.

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