

Utilizing Endoscopy to Assist in Harvesting the Pedicled Pectoralis Major Muscle Flap for Axillary Defect Repair: Case Report

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Background: The pedicle pectoralis major muscle flap is the primary workhorse flap used in head, neck, and large axillary reconstruction; however, traditional harvesting techniques may leave significant donor site scarring.

Case Report: Endoscopy-assisted harvesting of a pedicled pectoralis major muscle flap, or muscle flap and musculocutaneous flap, was performed in two patients, after which axillary defects were closed with a 4 cm incision at the 5th intercostal space using the harvested flap matching the size of the defect. The harvesting process took 40 and 32 minutes, respectively, and patients were able to return home at 5 to 7 days post-surgery. No postoperative complications were observed in either patient.

Conclusion: Endoscopic harvesting of the pedicled pectoralis major flap helps to reduce the extent of skin incisions because it gathers the pedicle vessel under the skin. Furthermore, it minimizes postoperative complications such as long hypertrophic scars.

Keywords: Endoscopic pectoralis major flap; Minimally invasive surgery

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The use of the pectoralis major muscle pedicle flap in surgery dates back to 1978⁽¹⁾. This type of muscle was primarily used to close large wounds in the head and neck region, and later studies conducted in 1979 found it to be a reliable and convenient option for wound closure in these areas⁽²⁾. The pectoralis major muscle, because of its thickness and width, fan-like shape, is often considered a primary choice for dealing with large wounds in the head and neck⁽³⁾.

The classic approach to harvesting the pedicled pectoralis major muscle flap requires performing a long incision to locate the thoracoacromial trunk vessel and dissecting it to extend within the flap. Sometimes, there is a risk of perforator vessels not being included with the flap.

In the present day, minimally invasive surgery

has expanded its potential for assisting in harvesting muscle flaps, such as the gracilis muscle flap, rectus femoris muscle flap, external oblique flap, and gastrocnemius muscle flap, leading to the development of safe and clinically effective techniques⁽⁴⁾. Arif et al. introduced endoscopy-assisted harvesting of the pectoralis major flap for head and neck reconstruction, which can yield shorter anterior chest wall incisions than those resulting from the conventional vertical approach in accessing the thoracoacromial vessel⁽⁵⁾. The present research reported the use of endoscopy-assisted harvesting of a pedicled pectoralis major muscle flap for axillary reconstruction in two cases involving the use of the pedicle muscle flap and the musculocutaneous flap. These two case reports were reviewed and approved by the Ethics Committee, Rajavithi Hospital (No.205/2566), and written informed consents were obtained.

Case Report

Surgical technique (Figure 1)

First, the thoracoacromial blood vessel was identified, after which the flap on the pectoralis major muscle was designed and harvested, beginning with performance of an incision of approximately 4 cm in size to hide the scar. For the female patient, this

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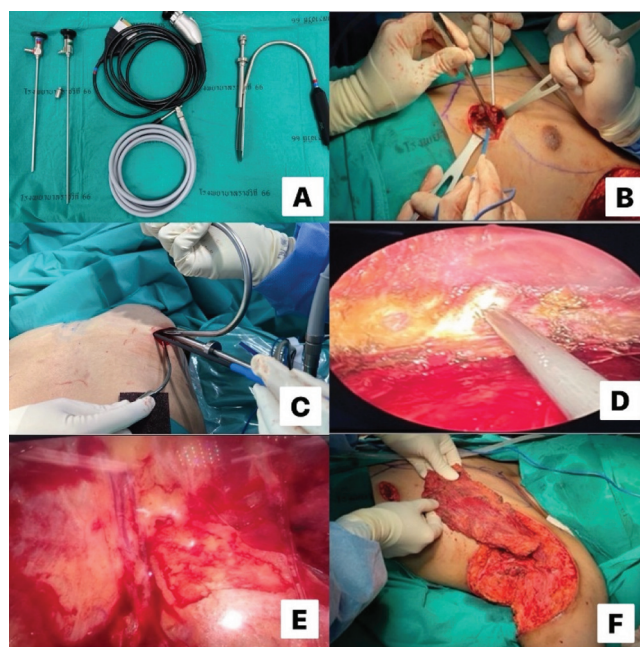


Figure 1. (A) Endoscopic camera (10 mm, 30-degree oblique) with a retractor port. (B) The position of the incision made at the 5th intercostal space in order to access and harvest the pectoralis major flap. (C) A camera monitor system, electrocautery dissection and suction were performed through the same chest incision. (D) Endoscopic view of the pectoralis major muscle. (E) Endoscope assistance helped to clearly identify the thoracoacromial pedicle. (F) A tunnel, approximately 5 to 10 cm in length, was created surgically to reach the desired reconstruction site and establish the flap positioning.

was made under the breast fold, the inframammary fold, and for the male, it was made around the fifth intercostal space. Electrocautery dissection was used to work under direct vision beneath the pectoralis major muscle. Using an endoscopic camera, 10 mm at 30-degree oblique, with a retractor port connected to a camera monitor system, electrocautery dissection and suction were performed through the same chest incision. Electrocautery dissection defined the flap boundaries according to the size of the defect to be reconstructed. The pectoralis muscle was dissected from its insertion points, both the medial and lateral parts. The thoracoacromial vessel supplying the flap was identified, and a tunnel was opened, stretching 5 to 10 cm towards the desired reconstruction site. The flap was positioned appropriately, without excessive tension, and blood drainage tubes were placed beneath it before it was sutured to the surrounding tissue. When the pedicle muscle flap was chosen, a skin graft was placed on its surface and sutured to secure the graft onto the muscle flap. A negative pressure dressing was applied and removed seven days after surgery⁽⁵⁾.

Case 1 (Figure 2)

A 72-year-old Thai female patient with history of

high blood pressure and high cholesterol had noticed new lumps on her right axillary, approximately 2×2 cm and 6×11 cm, about five months previously. She underwent incisional biopsy, and the pathological report revealed malignant melanoma (stage T4N2M0). She received wide excision and axillary lymphatic node dissection with endoscopy-assisted musculocutaneous pectoralis major flap surgery and complete axillary node dissection. It took 32 minutes to harvest the flap. She experienced no post-operative complications and was discharged after five days.

Case 2 (Figure 3)

A 32-year-old Thai male presented with hidradenitis suppurativa in the left axillary region. As previous medical treatments had been ineffective, he underwent surgery involving the excision and endoscopic-assisted harvesting of the pectoralis major muscle flap, coverage of the muscle with a split-thickness skin graft, and the use of a negative pressure dressing. The operation performed to harvest the muscle flap took 40 minutes. The patient was hospitalized for seven days and did not experience any post-operative complications.

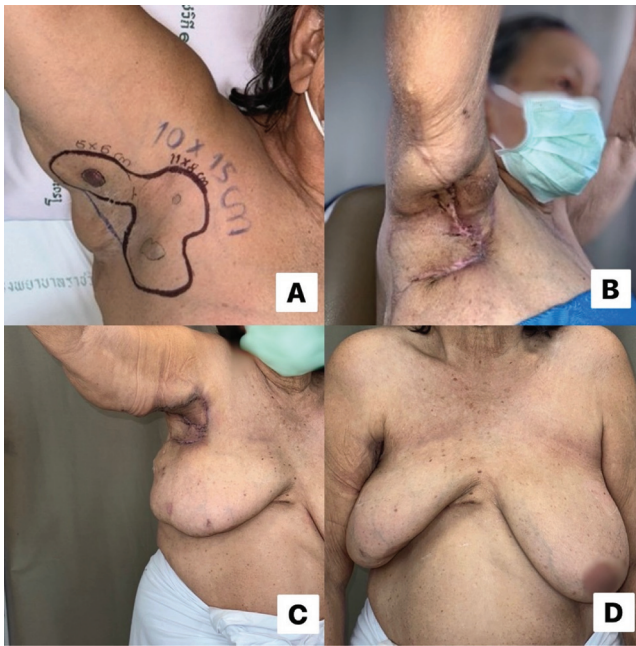


Figure 2. (A) Pre-operative picture. (B) 2-month post-operative picture. (C, D) 11-month post-operative picture.



Figure 3. (A) Pre-operative picture. (B) 3-month post-operative picture. (C, D) 18-month post-operative picture.

Discussion

The utilization of minimally invasive surgery became widespread in the twentieth century. Endoscopic-assisted surgery involves inserting an endoscope through small incisions or natural body openings to aid in diagnosis and surgery⁽⁶⁾.

The use of endoscopy in surgery is widely accepted, and it can be employed in a variety of areas of the body. Endoscopic-assisted surgery helps in several ways, such as by reducing incision size or eliminating the use of incisions where they are unnecessary. In cosmetic surgery, there are some

indications for endoscopic assistance, for example, in breast surgery, brow lift surgery, and even in harvesting flaps such as the omentum, jejunal free flap, latissimus dorsi muscle flap, rectus abdominis muscle flap, gracilis muscle flap, rectus femoris muscle flap, external oblique muscle flap, and gastrocnemius muscle flap. These techniques can also be beneficial in cranioplastic and maxillofacial trauma surgeries⁽⁷⁻¹⁰⁾.

The use of endoscopic cameras helps physicians in situations involving deep or challenging locations, such as when it is necessary to harvest the pectoralis major flap, which is a difficult part of the chest wall to access with small incisions. Combining endoscopic cameras and tools can assist in resolving such issues.

Endoscopic assistance in surgery is beneficial when:

1. Performing surgery through small incisions to prevent complications associated with large incisions.
2. Harvesting flaps, making it easier for surgeons to decide on harvesting.
3. Clear identification of critical structures is required, such as neurovascular structures, which can be obtained through endoscopic camera visualization.
4. Identification of the specific location for cutting the pectoralis major muscle is necessary to estimate flap size accurately⁽¹¹⁾.

The use of endoscopic assistance enhances visualization, enabling precise identification of neurovascular structures from the undersurface of the pectoralis major muscle. Dissection of the flap from the subcutaneous tissue eliminates the need for a medial skin incision from the xyphoid process to the acromion, which is required in the traditional harvesting method, to access the pedicle pathway⁽¹²⁾ (Figure 4). Additionally, this technique allows for the dissection of the insertion of the pectoralis major muscle without the need for additional incisions.

This surgical approach also helps to address issues with donor site morbidity, such as unsatisfactory cosmetic outcomes and scarring. Reducing the length of the donor harvest flap incision helps mitigate complications associated with long scars, such as hypertrophic scars or keloids⁽¹³⁾.

This surgical technique may require slightly longer operative times than conventional pectoralis major muscle flap harvesting, as it involves employing instruments in challenging-to-access areas and requires physicians to be skilled in endoscopic tool manipulation.

In the present report, the defect in the axillary



Figure 4. Post operative view of the chest donor site in traditional method⁽¹²⁾.

region posed challenges in harvesting the upper medial part of the pectoralis major muscle flap. The authors proposed an inframammary fold incision with endoscopic visualization to precisely define the boundaries. The utilization of the electrocautery to cut the upper medial part of the flap facilitates access and reduces the need for additional incisions.

A limitation of the present study is that it was retrospective in design and collected data from a single institution, restricting its widespread applicability, which may not be representative of the entire spectrum of responses. It should be supplemented by further studies or an increase in the number of sites. The success of endoscopy-assisted pectoralis major flap harvesting depends on factors such as the surgeon's experience and expertise in using endoscopic tools.

Conclusion

The pectoralis major flap is a conventional choice for head, neck, and axillary reconstruction surgery. The present study demonstrated that endoscopy-assisted flap harvesting can reduce the number and size of skin incisions, facilitate access to challenging areas, and obtain clear structure identification. This method may be an effective alternative modality for use in harvesting the pectoralis muscle flap in reconstruction procedures.

What is already known on this topic?

Research articles have provided information on using endoscopy for harvesting a pedicle flap, which has been successful. However, there is currently no published information in Thailand regarding the use

of the pectoralis major flap to address defects in the axilla.

What does this study add?

This research has presented surgical techniques and methods, along with showcasing examples of patients treated with these procedures, yielding positive results.

Conflicts of interest

The authors declare no conflict of interest.

References

1. Ariyan S. The pectoralis major myocutaneous flap. A versatile flap for reconstruction in the head and neck. *Plast Reconstr Surg* 1979;63:73-81.
2. Ariyan S. Further experiences with the pectoralis major myocutaneous flap for the immediate repair of defects from excisions of head and neck cancers. *Plast Reconstr Surg* 1979;64:605-12.
3. Wei WI, Wai CY. Pectoralis major flap. In: Wei FC, Mardini S, editors. *Flaps and reconstructive surgery*. 2nd ed. New York: Elsevier; 2017. p. 396-415.
4. Seify H, Jones G, Sigurdson L, Sherif A, Refky M, Bolitho G, et al. Endoscopic harvest of four muscle flaps: safe and effective techniques. *Ann Plast Surg* 2002;48:173-9.
5. Turkmen A, Perks AG. Endoscopic assisted harvest of the pedicled pectoralis major muscle flap. *Br J Plast Surg* 2005;58:170-4.
6. Ramirez OM, Daniel RK. *Endoscopic plastic surgery*. 2nd ed. Boston: Springer; 1995.
7. Miller MJ. Minimally invasive techniques of tissue harvest in head and neck reconstruction. *Clin Plast Surg* 1994;21:149-59.
8. Chou C, Tasi MJ, Sheen YT, Huang SH, Hsieh TY, Chang CH, et al. Endoscope-assisted pectoralis major-rectus abdominis bipedicle muscle flap for the treatment of poststernotomy mediastinitis. *Ann Plast Surg* 2016;76 Suppl 1:S29-34.
9. Sawaizumi M, Onishi K, Maruyama Y. Endoscope-assisted rectus abdominis muscle flap harvest for chest wall reconstruction: early experience. *Ann Plast Surg* 1996;37:317-21.
10. Ramakrishnan V, Southern S, Hart NB, Tzafetta K. Endoscopically assisted gracilis harvest for use as a free and pedicled flap. *Br J Plast Surg* 1998;51:580-3.
11. Katsuragi-Tomioka Y, Nakagawa M. Endoscopic flap design and harvesting. In: Raposio E, editor. *Atlas of endoscopic plastic surgery*. New York: Springer International Publishing; 2016. p.125-34.
12. Fernandes R. *Local and regional flaps in head & neck reconstruction: A practical approach*. Iowa, USA: Wiley-Blackwell; 2014.
13. Liu M, Liu W, Yang X, Guo H, Peng H. Pectoralis major myocutaneous flap for head and neck defects in the era of free flaps: Harvesting technique and indications. *Sci Rep* 2017;7:46256.