



Endoscopic Thoracic Sympathectomy for Digital Ischemia of the Right Hand: a Case Report of Improved Tissue Preservation and Pain Control

Massimo Castiglioni¹ · Alberto Meroni¹ · Chiara Novelli² · Roger Vitiello³ · Matteo Incarbone¹

Received: 17 July 2020 / Accepted: 9 October 2020 / Published online: 16 October 2020

© Association of Surgeons of India 2020

Abstract

Despite the development of vascular reconstruction techniques, thoracic sympathectomy still represents a valid therapeutic option for certain ischemic disorders. In selected patients for which direct revascularization is not feasible because of the very peripheral localization of vascular lesions, sympathectomy maximizes tissue preservation thus preventing or delaying major amputation and it permits optimal pain control. Also, thoracic sympathectomy can be safely performed with a minimally invasive technique, reducing operative time and morbidity. We report the case of a patient with peripheral ischemic disease of his right hand that was successfully treated by endoscopic thoracic sympathectomy. Surgery was safe and effective in controlling pain and maximizing tissue preservation, preventing major amputation.

Keywords Endoscopic thoracic sympathectomy · Digital ischemia

Case Report

Endoscopic thoracic sympathectomy (ETS) is mainly recommended for primary hyperhidrosis. Less common indications include selected patients with Raynaud's syndrome, ischemic disease of upper limb extremities, complex regional pain syndrome and long QT syndrome refractory to clinical therapy [1, 2]. We present a case of a patient, with incoercible pain due to

digital ischemia of the right hand, who was treated with unilateral ETS that permitted optimal symptoms control and maximum tissue salvage.

The patient is a 67-year-old, right-handed male with a peripheral ischemic disease of his right hand. He was a bank clerk, has never smoked and has an unremarkable medical history. He had already been to the emergency department of another hospital complaining of pain and cyanosis in the 2nd and 3rd fingers of the right hand. There, he had reported clinical onset 1 month earlier, some days after the prolonged use (7–8 consecutive hours) of a grass trimmer; symptoms had initially been mild but they had become gradually worse. On physical examination, the 2nd and 3rd fingers showed distal cyanosis at P3 level, complete numbness, but were warm and without deficits in movement. Colour Doppler ultrasonography showed normal palmar perfusion and the radiography did not identify fractures or articular anomalies. The patient was dismissed with a medical therapy. A few days later, the patient arrived at our emergency department with heightened pain; the 2nd finger was found to be ischemic at P3 level without a clear demarcation of the necrotic area, while the 3rd finger showed only faint signs of revascularization at P3 level. The medical therapy was then maximized and the patient was discharged. At one-week follow-up, the demarcation of the necrotic areas was still not visible. Due to incoercible pain, the patient was admitted to the Department of Vascular

✉ Massimo Castiglioni
massimo.castiglioni@multimedica.it

Alberto Meroni
alberto.meroni@multimedica.it

Chiara Novelli
chiara.novelli@multimedica.it

Roger Vitiello
roger.vitiello@multimedica.it

Matteo Incarbone
matteo.incarbone@multimedica.it

¹ Department of Thoracic Surgery, IRCCS MultiMedica, Milan, Italy

² Department of Plastic and Reconstructive Surgery, Hand Surgery Unit, IRCCS MultiMedica, Milan, Italy

³ Department of Vascular Surgery, IRCCS MultiMedica, Milan, Italy

Surgery. He underwent intravenous prostanoid administration and axillary brachial plexus blocks with Naropin, thus achieving a good clinical response. A right upper forearm arteriography showed the occlusion of the first common palmar artery (Fig. 1). Since the patient was not treatable by direct surgical revascularization, and severe pain still occurred despite maximal medical therapy, right 5-mm biportal ETS was recommended. Under general anaesthesia, multiple sympathectomies were performed by cutting pre- and post-ganglionic fibers from T2 to T4 ganglia with an L-shaped hook cautery. The intervention lasted 20 min and it was uneventful. After surgery, the patient reported a rapid and significant reduction in pain. One week later, the necrotic areas were clearly demarcated (Fig. 2). The patient underwent under local anaesthesia sub-total P3 amputation of the 2nd finger and debridement of the apical P3 of the 3rd finger. The intervention lasted 17 min and it was uneventful. The patient was discharged 4 days later with optimal pain control through the use of oral medication. A protocol of rehabilitation was also provided. At 1-year follow-up, the patient reported normal right-hand function and no need of pain medication. Also, there was no onset of complications or adverse events related to ETS, such as compensatory sweating, inter costal neuralgia and ptosis.

Discussion

In the past, sympathectomy was used extensively for the treatment of ischemic disorders; currently, it still has a place in selected patients with symptomatic peripheral ischemia of the upper extremities of either obstructive (thromboangitis obliterans) or spastic origin (Raynaud's disease, hand arm vibration syndrome) [2]. Despite the development of arterial reconstruction techniques, direct revascularization for digital ischemia is frequently not feasible because of the very peripheral localization of the vascular lesions. When medical

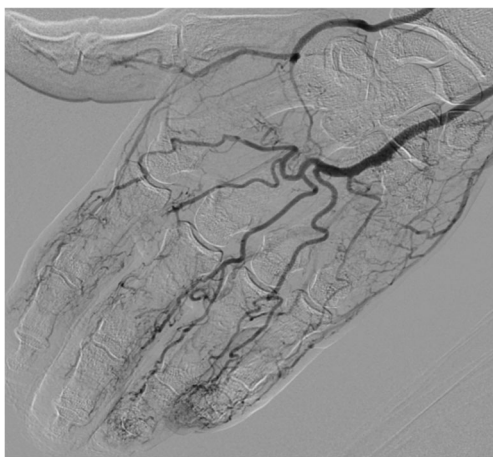


Fig. 1 Right upper forearm arteriography showing the occlusion of the first common palmar artery

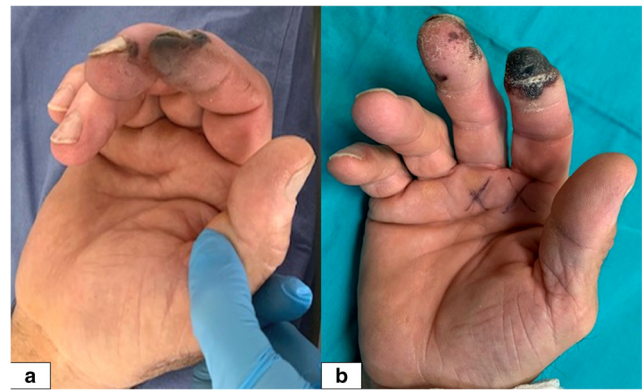


Fig. 2 Necrotic areas before (a) and one week (b) after endoscopic thoracic sympathectomy

treatment or local tissue care may be unsuccessful, ETS represents an effective therapeutic option since it maximizes tissue preservation, prevents or delays major amputation and permits optimal symptomatic control of pain [3–5]. Previous studies on microvascular physiology have shown that thoracic sympathectomy permits significant improvement of capillary blood flow which does not differ from that seen in healthy subjects; moreover, the improvement of the microcirculation is not only a temporary observation but it remains visible over a longer period [6, 7]. This is due to the interruption of the sympathetic chain that induces the release of vasomotor control and hyperactive tone of the small arteries and arterioles, thus improving the circulation to the skin, the soft tissue and the bone of the peripheral extremities [6]. Also, the role of a bradykinin-induced inflammation after thoracic sympathectomy was investigated [8]. Patient satisfaction one year after surgery was excellent. However, the diminishing effect of ETS is not an uncommon phenomenon and long-term benefits should be also evaluated [4].

In conclusion, ETS was safe and effective to control pain and led to the demarcation of the necrotic areas maximizing tissue preservation. ETS should be considered early in the natural course of digital ischemia.

Data Availability Not applicable

Compliance with Ethical Standards

Conflict of Interest Nothing to declare

Code Availability Not applicable

References

- de Campos JR, Kauffman P, Faustino CB, Wolosker N (2018) Upper extremity sympathectomy. *J Vis Surg* 4:180
- Hashmonai M, Cameron AEP, Licht PB, Hensman C, Schick CH (2016) Thoracic sympathectomy: a review of current indications. *Surg Endosc* 30:1255–1269

3. De Giacomo T, Rendina EA, Venuta F, Lauri D, Mercadante ES, Anile M et al (2002) Thoracoscopic sympathectomy for symptomatic arterial obstruction of the upper extremities. *Ann Thorac Surg* 74:885–888
4. Coveliers H, Hoexum F, Rauwerda JA, Wisselink W (2016) Endoscopic thoracic sympathectomy for upper limb ischemia. A 16 year follow-up in a single center. *Surgeon* 14:265–269
5. Coveliers H, Hoexum F, Nederhoed JH, Wisselink W, Rauwerda JA (2011) Thoracic sympathectomy for digital ischemia: a summary of evidence. *J Vasc Surg* 54:273–277
6. Koman LA, Smith BP, Pollock FE, Smith TL, Pollock D, Russell GB (1995) The microcirculatory effects of peripheral sympathectomy. *J Hand Surg* 20:709–717
7. Maga P, Kuzdzał J, Nizankowski R, Szczeklik A, Sładek K (2007) Long term effects of thoracic sympathectomy on microcirculation in the hands of patients with primary Raynaud disease. *J Thorac Cardiovasc Surg* 133:1428–1433
8. Leis S, Meyer N, Bickel A, Schick CH, Krüger S, Schmelz M, Birklein F (2010) Thoracoscopic sympathectomy at the T2 or T3 level facilitates bradykinin-induced protein extravasation in human forearm skin. *Pain Med* 11:774–780

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.