Reconstruction of the dorsal foot with a retrograde flow lateral supramalleolar flap in a 4-year-old child

Reconstrução de dorso do pé com retalho supramaleolar lateral de fluxo reverso em menores de 4 anos de idade

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ABSTRACT

Introduction: Injuries in the distal third of the leg may expose noble areas that should be covered. The lateral supramalleolar flap is one of a series of flaps described in the last decade; it is an elevated fasciocutaneous flap in the lateral aspect of the lower leg, and is employed as a distally based pedicled flap. The purpose of this case report is to present the surgical results and the effectiveness of the lateral supramalleolar flap in extensive lower limb injuries with significant loss of substance in a 4-year-old child. Case Report: Patient A. K. E. S., a girl, was admitted 13 years previously. She had been in an accident, and had extensive injuries on the dorsum of the left foot, with exposure of noble areas approximately 6 cm in diameter. After debridement, lesion coverage was performed on the fifth day by using a fasciocutaneous lateral supramalleolar flap. The patient was discharged for outpatient monitoring and progressed without complication. She only returned to the hospital 13 years later, overweight and complaining of swelling on the dorsal aspect of the foot. Lipectomy of the distal third of the flap was performed, with uncomplicated progress. A second procedure for the proximal third was scheduled six months later. Discussion: Injuries in the distal third of the leg may expose noble areas. Lateral supramalleolar, sural, and pedicled perforating flaps have similar applications, but show individual technical peculiarities. The lateral supramalleolar flap has no need for microsurgery, is rapidly performed, and simulates the receiving area while considering several local characteristics. Conclusion: This flap is easily implemented and reproducible, and can be used in children younger than 5 years of age. It is an alternative for injuries in the lower third of the leg, the ankle, and the foot.
**RESUMO**

Introdução: Lesões em terço distal da perna podem deixar expostas áreas nobres, que devem ser recobertas. O retalho supramaleolar lateral faz parte de uma série de retalhos descritos na última década, é fasciocutâneo elevado no aspecto lateral da perna inferior, sendo empregado como um retalho pediculado com base distal. O objetivo do presente relato de caso é apresentar os resultados cirúrgicos e a eficácia do retalho supramaleolar lateral em lesões extensas no membro inferior com perdas de substâncias significativas em criança de 4 anos. **Relato de Caso:** Paciente A.K.E.S., sexo feminino, foi internada há 13 anos, vítima de atropelamento, com lesão extensa em dorso de pé esquerdo com exposição de áreas nobres de aproximadamente seis centímetros de diâmetro. Após desbridamento, no quinto dia foi realizada cobertura da lesão com retalho fasciocutâneo supramaleolar lateral. A paciente teve alta para acompanhamento ambulatorial, evoluindo sem intercorrência. Ela retornou ao serviço apenas 13 anos após com sobrepeso e reclamando do aumento de volume no dorso do pé. Foi realizada lipectomia do terço distal do retalho, evoluindo sem intercorrência. Um segundo procedimento do terço proximal foi programado para seis meses após. **Discussão:** Lesões no terço distal da perna podem expor áreas nobres. Os retalhos supramaleolar lateral, sural e de perfurantes pediculados possuem aplicações semelhantes, mas apresentam peculiaridades técnicas individuais. Como vantagens no retalho supramaleolar lateral: não há necessidade de microanastomoses, é rápido para ser executado e simula a área receptora em várias características locais. **Conclusão:** É um retalho de maior facilidade de execução e reprodutível, podendo ser realizado em crianças menores de 5 anos. Tem sua aplicação como alternativa para lesões em terços inferiores da perna, tornozelo e pé.

**Descritores:** Retalhos cirúrgicos; Extremidade inferior; Procedimentos cirúrgicos reconstrutivos; Traumatismos da perna.

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**INTRODUCTION**

There has been an improvement in the quality and success of orthopedic salvage in association with advances in trauma and emergency management. Consequently, there has been an increase in the need for repair of injuries in hard-to-reach places. For the treatment of injuries in the lower third of the foot, local and microsurgical flaps are used.

The decision on the best technique depends on several factors, including location, extent of injury, exposure of noble areas, and the experience of the surgeon. Injuries in the distal third of the leg may expose noble areas that should be covered with good quality vascularized tissue.

The lateral supramalleolar flap is one of a series of flaps described in the last decade. It is based on secondary arteries, and is an elevated fasciocutaneous flap in the lateral aspect of the lower leg, employed as a distally based pedicled flap.

The vascular supply of the lateral supramalleolar flap is based on the anastomotic arcade of the ankle. The perforating branch of the fibular artery forms anastomoses with the anterior lateral malleolar artery, which emerges from the anterior tibial artery, descends anteriorly to the tibiofibular syndesmosis, and anastomoses with the lateral tarsal artery on the lateral side of the foot. It is accompanied by a venous network that can replace the dorsalis pedis artery (dorsal artery of the foot). The cutaneous
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branches run anterior to the fibula, taking an upward course and anastomosing with the vascular network that accompanies the superficial fibular nerve.

Skin flaps based on pedicled perforating vessels, especially for coverage of the distal third of the leg in children, have hardly been explored, with few reports in the literature.

Thus, the purpose of this case report is to present the surgical outcomes and the efficacy of the lateral supramalleolar flap in extensive injuries in the lower limb, with significant tissue loss, in a 4-year-old child.

CASE REPORT

Patient A. K. E. S., a girl, was admitted 13 years previously, after being in an accident, with extensive injuries on the dorsum of the left foot, including bone and ligament exposure approximately 6 cm in diameter. After debridement of the injury upon admission, coverage with a fasciocutaneous lateral supramalleolar flap on the anterior region of the left foot was scheduled and performed on the fifth day (Figure 1). The patient was hospitalized for 14 days. On outpatient follow-up, the flap presented without necrosis and with good perfusion (Figure 2).

After outpatient discharge, the patient only returned to the hospital 13 years later, overweight and complaining of swelling on the dorsal aspect of the foot. A new surgical treatment was planned, to reduce the thickness of the flap (Figure 3). Lipectomy of the distal third of the flap was performed. The patient was hospitalized for 24 hours, discharged for outpatient follow-up, and progressed without complications. A second procedure on the proximal third was scheduled six months later (Figure 4).

DISCUSSION

Injuries of the distal third of the leg may expose noble areas, such as bones, tendons, nerves, and vessels. These require highly complex surgeries, such as microsurgical flaps, to ensure satisfactory aesthetic and functional results.

The donor and recipient areas of the distal leg allow good functional and aesthetic results, due to their greater elasticity and thinner flaps; however, the flaps are thicker in children. Fasciocutaneous flaps include the fascia, and result in increased vascularization. This has resulted in an increase in their indication for coverage of lesions in distal areas. With the introduction of 180° rotated helical flaps, based on a perforating vessel as the axis, the versatility for the repair of difficult lesions has expanded.

The distribution of perforating arteries is random in the leg. However, 10 predictable fasciocutaneous locations were described by Whetzel et al., based on intermuscular septa. These studies are useful for the planning of flaps for coverage of the lower

Figure 1. Preoperative appearance with the demarcations of the flap.

Figure 2. Three-month postoperative appearance.
of the leg, ankle, and foot, and may be performed in adults and children. Success is due to a thinner flap, which offers like-for-like features, such as similarity in color and texture.\textsuperscript{10}

The indications for the lateral supramalleolar flap outweigh those of the sural flap, and its success rate makes it an alternative to microsurgical flaps (which are more complex and have a greater risk of losses).\textsuperscript{11}

The lateral supramalleolar flap has no need for microsurgery, is rapidly performed, simulates the receiving area in several aspects, and is reproducible in children.\textsuperscript{12} The complications are the same as for any type of flap, including infection, hematomas, dehiscence, and necrosis.\textsuperscript{4}

CONCLUSION

This is an easily executed and reproducible flap, and can be performed in children. Refinements were needed to obtain optimal aesthetic quality, with good functional recovery. It can be applied as an alternative for injuries in the lower third of the leg, the ankle, and the foot.

REFERENCES