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Single incision fasciotomy for acute compartment syndrome of the leg: A systematic review of the literature

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ABSTRACT

Purpose: To review published literature assessing clinical outcomes and complication rates of single incision fasciotomy in fractures of the lower leg.
Methods: We searched PubMed and EMBASE for articles published through July 5, 2021, using the terms "single incision fasciotomy", "acute compartment syndrome of the limbs", "compartment syndrome fasciotomy", and "(compartment syndrome fasciotomy) AND (incision)". The inclusion criteria were studies of Level I to IV evidence in English, published in 1970 or later, involving human subjects, reporting clinical outcomes of single incision fasciotomy performed in cases of acute compartment syndrome in lower leg fractures, including at least 1 patient.
Results: Among the 3040 combined total results, 11 primary studies met our inclusion criteria. Adequate and safe compartment release was achieved with single-incision technique. No significant difference was found in terms of complications such as infection and non-union.
Conclusions: The comparative efficacy and safety of single-incision fasciotomy is relatively equal to the two-incision techniques when evaluated in the literature. However, double-incision fasciotomy remains the predominant surgical technique, widely preferred by surgeons due to the familiarity with the technique and ease of full compartment release. In addition to the actual fasciotomy procedure, data suggests that operative timing, closure and fixation techniques can significantly impact patient outcomes. These findings may be used to guide the orthopedic community when determining the optimal incision-type to use in acute compartment syndrome emergencies for lower-extremity fracture cases in conjunction with closure and fixation techniques.

1. Introduction

Acute compartment syndrome (ACS) is a medical emergency that normally occurs after major trauma, such as fractures, or vascular injury to an extremity. The tissue pressure in a fascial compartment increases to such an extent that the local arteriovenous pressure gradient drops inducing blood stasis.[1] The limited blood flow to muscles and nerves contained within that compartment, which is covered by a membranous fascia, leads to tissue ischemia and necrosis, since the living tissue is unable to receive sufficient oxygen, resulting in cell death. Expansion of contents or decrease in compartment volumes, usually from surgical closure or tissue defects, are common causes of elevated compartment pressures. Additionally, compartment syndromes can be categorized into either acute or chronic stages but acute compartment syndrome was the focus of this literature review. Acute compartment syndromes commonly occur in the extremities, especially the tibia or forearm.[1]

The most serious outcomes of delayed intervention or untreated compartment syndrome include limb amputation and death, therefore, it is imperative that the condition is recognized and treated as soon as possible. Some of the more common effects of surgical intervention to ACS includes lingering disability when major structures are injured during acute compartment syndrome episode or during the actual surgical intervention itself. The nerves are delicate, much more fragile compared to the muscles and sensitive to elevated conditions, and can be affected by just 4 h of exposure to elevated compartment pressures.[2] Therefore, an early diagnosis and aggressive treatment are essential in

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preventing significant long-lasting effects that can dramatically alter a patient's quality of life.[1] In many cases, it can be a challenge to properly manage this condition in a timely manner since the diagnosis of acute compartment syndrome is largely clinical. Major indicators of compartment syndrome include pain out of proportion, pain upon passive stretching of muscle, and elevated pressure within a compartment.[3]

An emergency fasciotomy is performed to relieve the area of high compartment pressure and reduce the risk of ischemia. To treat ACS of the lower leg, many authors recommend a procedure that allows for the decompression of all four compartments (anterior, lateral, deep posterior, and superficial posterior). Lower limb fasciotomies are usually performed, often with either a single lateral incision, or by using two incisions, anterolaterally to decompress the anterior and lateral components and posteromedially for the release of the deep and superficial compartments. Although two-incision technique is the most commonly used technique, single incision fasciotomy is recommended by some authors for maintaining stability of fractures and minimizing additional soft tissue trauma.[4] One of the major concerns for single-incision fasciotomy is an incomplete decompression of the affected compartments in particular the posterior and posterior deep compartment. This could lead to potentially devastating outcome if the affected compartment isn't adequately released. To date, no systematic review has been completed on the efficacy and safety of single-incision fasciotomy in fractures of the leg. The aim of this study is to systematically review the literature on clinical outcomes and complications of single-incision fasciotomy in leg fractures. This will help guide orthopaedic surgeons determine which technique to use in managing ACS.

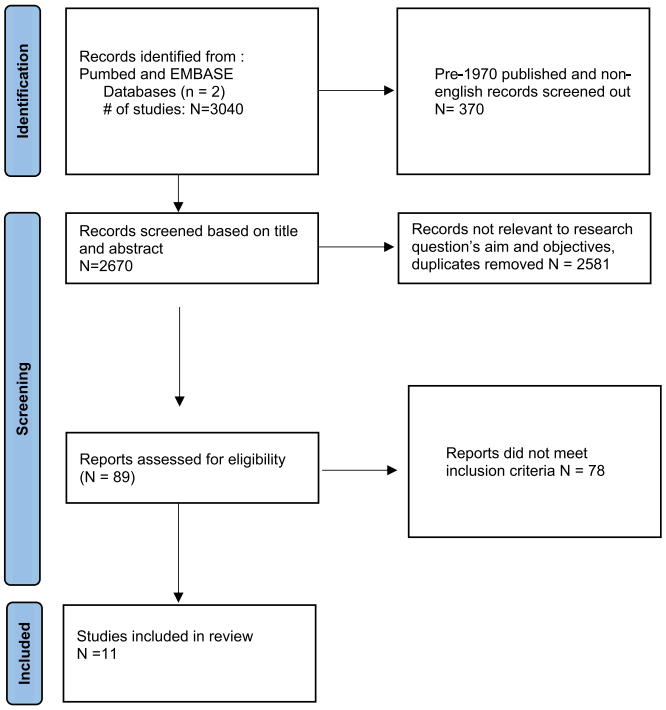


Fig. 1. Modified prisma flow chart.

2. Materials and methods

A comprehensive literature search in PubMed and EMBASE for articles published from 1970 to present were reviewed. Inclusion criteria was 1) Human studies that discussed acute compartment syndrome in the context of lower extremity fracture cases, either exclusively or within a larger subset of injuries ranging from below the knee to ankle. 2) Studies that included discussion on single-incision compartment release or single incision and double incision release. Studies were excluded if 1) published in a language other than English, 2) discussed chronic exertional compartment syndrome 3) Study included fasciotomies on feet, upper legs, and all other parts of the human body 4) The study did not specify what type of fasciotomy was performed and/or they did not mention lower leg fracture cases were part of the study population.

The search terms were "fasciotomy", "single incision fasciotomy", "acute compartment syndrome of the limbs", "compartment syndrome fasciotomy" and "(compartment syndrome fasciotomy) AND (incision)". With limits such as English language and removing publications before 1970, we identified 2670 potential papers. After screening for topic relevancy and removing duplicates, we identified 89 papers. Upon review of the full text of the 89 papers, we found 11 papers that fit our inclusion criteria and served as our primary analysis (see Fig. 1).

All papers were independently reviewed by three authors (AER, MK and SY). All primary studies addressed interventions for fractures of the lower leg and acute compartment syndrome. To supplement our primary papers, we also cited other literature that did not qualify for inclusion but provided a richer context to the topic of discussion.

3. Results

3.1. Efficacy

In a retrospective study by Chang et al., the efficacy of the single-incision approach to four-compartment fasciotomies were examined. Eleven patients were included with mean follow-up length of 12 months. All patients were treated for ACS followed by skin closure using VAC wound closure device. The research group looked at instances of malunion, infection, neurovascular injury and neurological deficits, any indications of incomplete release of all four compartments through the single-incision procedure and requiring a need for skin grafting. All patients' wounds closed without the need for skin grafts, with the mean time to primary closure being 4.5 days.[2] One patient had distal wound breakdown that closed with secondary intention and another patient experienced tibial fracture nonunion. However, there were no cases of infection (superficial or deep), neurovascular injury intraoperatively, or neurological deficits as outcomes of the single-incision fasciotomy.[2] This study showed that single-incision fasciotomy was effective for treating ACS of the lower leg in conjunction with vacuum-assisted wound-closure dressing.

Maheshwari et al. investigated the usage of single-incision, four-compartment fasciotomy of the leg without fibulectomy in the treatment of diaphyseal tibial fractures with compartment syndrome. Compartment measurements were taken to support clinical suspicion of ACS although the decision to undergo fasciotomy was a clinical one in all cases.[5] In the 74 compartments measured, the mean compartment pressure was 55 mmHg. In all 58 legs, a lateral single-incision fasciotomy was performed to release all four compartments. Fifty-five tibia were stabilized and 49 also had medullary nails, three had plate fixations and another three with external fixations. Three patients died before definitive wound closure. Among the patients that survived long-term follow-up, 29 legs had repeated surgical debridements prior to wound closure and 32 required split-thickness skin grafting. Twenty-one patients had delayed primary closure and two patients had open-wound care secondary to acute wound infections. The mean time to primary closure or skin grafting took six days post-fasciotomy. There were no reported cases of inadequate compartmental release. One patient with a ballistic tibial shaft fracture required multiple return visits to the operating room. The authors argue that the muscle imbalance and soft tissue damage from the injury were the major reasons of arising complications and deformities and the fasciotomy is not to blame. No other treatments involved managing symptomatic deformities of foot or ankle. It was noted that access to the deep posterior compartment is limited with the technique since debridement of the tibialis posterior muscle is challenging. However, it is also found to be difficult using the medial

incision of the double-incision technique. This study showed that single-incision fasciotomy is efficacious and can adequately decompress the compartments of the lower leg with minimal postoperative complications. Additionally, familiarity with the technique would help establish this method as a treatment option for ACS with minimal soft tissue morbidity and adequate surgical outcome.[5]

Another study explored the combined results of single-incision fasciotomy combined with other stabilization methods such as unreamed tibial nail. Hak et al. followed the cases of 12 patients with tibial fractures and suspected compartment syndrome.[6] The patients all underwent lateral four-compartment fasciotomy and unreamed locked intramedullary nail. 10 patients achieved union with a mean follow-up of 8.1 months. Full anatomic reduction occurred except for the patient with a high proximal fracture. No infections were reported in any patient and no open fracture needed debridement. All fasciotomy wounds healed without any other issues with no leg length discrepancies. There were two delayed unions and one nonunion. The nonunion case was a delayed diagnosis and treatment of ACS which resulted in weakened flexion and sensation. This study emphasized how single lateral incision can adequately decompress all four compartments while maximizing soft tissue of the fracture site.

DeLee and Stiehl presented a series of 104 open tibia fractures cases where 6 patients developed compartment syndromes involving all four compartments of the lower leg, and four of which developed after initial debridement and reduction. At six-month follow-up, five patients still did not have healed fractures.[7] Additionally, these patients had significant soft tissue loss and bone exposure. All six cases reported absent or weakened flexion of the foot and ankle and decreased sensation. The authors noted how although double-incision fasciotomy allowed for adequate decompression, there was so much marked loss of soft tissue support that single-incision fasciotomy would have been the preferred management method of ACS to allow for sustained stability throughout the healing process.[7] Overall, the study found that a complete 4-compartment decompression can be achieved with a single-incision fasciotomy reducing morbidity factors for patients in lower leg fracture cases with full closure of wound, union, and no significant long-term sequelae.

3.2. Safety

Bible et al. analyzed the rate of postoperative infections and nonunion in patients with tibial fractures that suffered from ACS. Over a 12-year period, 175 of these patients arrived at the trauma center with concurrent ACS and required immediate fasciotomy intervention. Some patients were treated with intramedullary nails and some were treated with plate fixation. Within the 60 patients treated with intramedullary nails, 35 patients had single-incision fasciotomy and 24 underwent double-incision fasciotomy.[8] The study tracked the occurrence of postoperative infection and nonunion in both fasciotomy groups. It was found that both groups had similar patient and treatment characteristics. The need for skin graft was similar. Additionally, for patients in the intramedullary nail intervention group, one infection occurred in the single-incision group versus two in the double-incision group, a non-significant difference ($P = 0.558$).[8] Bible et al. states how both techniques are effective for reducing intracompartmental pressures to safe numbers in order to prevent myonecrosis in cases of ACS associated with tibial fractures in the prevention of myonecrosis. In fact, there was no significant difference in patient outcomes including infection, nonunion rates after fixation, and need for skin grafting between the two treatment groups.[8]

Although tibial plateau fractures have been frequently documented in literature, the complexity of these cases adds a degree of challenge in making diagnosis and carrying out treatments.[9] In treating tibial plateau fractures, it is thought that compartment release in accompanying cases of ACS leads to increased risk of infection.[9] Thabet et al. examined 221 patients with tibial plateau fractures in one retrospective chart review and identified 23 patients who also experienced concurrent ACS. They examined post-operative complications especially wound infection defined as swelling, redness and drainage[9] and reviewed rates of union. In only one of the 23 cases, a single-incision fasciotomy was performed and had a full-follow up period while for all the others underwent two-incision fasciotomy. All patients healed and had union of their fractures. Only one patient in the cohort developed infection of the tibial plateau and that case (5.3%) was part of the double-incision fasciotomy group. This patient underwent two split-thickness skin grafting procedures and union was achieved with no further complications. Overall, the study reported an infection rate lower than those reported in previous studies. The incidence of delayed and nonunion of the tibial plateau fracture was also lower than previously reported. This study shows how ACS does not result in increased risk of nonunion or infection rate and both double-incision fasciotomy and single-incision fasciotomy can be used to perform safe, early decompression.[9]

Goyal et al. followed 32 tibial fractures cases with reported ACS. Thirty patients required urgent fasciotomy, 15 underwent the single-incision technique and the other 15 underwent the double-incision. In 29 patients, there was clinical union with a mean of 25.2 weeks. Goyal et al. reported no difference in outcome of either surgical technique ($P > 0.05$). Rather, they argued the outcome of ACS is determined largely by the timing of fasciotomy. The delay in their study was 7.91 h which is higher than the recommended 6 h window period. They expressed how the delay correlated with poor outcome scores ($P > 0.05$). To explain how more than 50% patients had poor outcome, the authors reasoned that it was likely due to the delay of timing of intervention and delay in the average time to diagnosis of ACS of 9 h. The extended time could have allowed for significant tissue damage by the time of intervention and influenced the nature of complications and patient outcomes. The study concluded that both single-incision and double-incision fasciotomy are safe and are not statistically different in functional outcome or complications.[10]

Below (Fig. 1) is a summary of the results of each study with key findings highlighted.

4. Discussion

For ACS in the lower leg, the single-incision technique includes making a longitudinal incision posterolaterally, parallel with the fibula. Full-thickness skin flaps are created in the anterior and posterior directions to be able to visualize all four compartments of the leg. The superficial peroneal nerve transverses the tissues anterior to the lateral compartment fascia so care must be given to avoid damaging that section. The fascial attachments of the superficial posterior, lateral and anterior and deep posterior compartment are released during this procedure.[11] The incision is made to release the pressure and tension in the superficial posterior, deep posterior, lateral and anterior compartments. Commonly, single-incision wounds are combined with a vacuum-assisted closure device.[11] The double-incision technique

involves a skin incision in the anterolateral aspect of the leg, anterior to the fibula, which provides access to the anterior and lateral compartments of the leg. In addition, a longitudinal incision is made on the posteromedial section to provide access to the superficial and deep posterior compartments. Similar closure and dressing techniques can be used on double-incision wounds.[11] Ultimately, the choice of fasciotomy is based on surgeon familiarity with the technique and patient condition. Neither single or double incision-technique have elevated nonunion risk or infection rate.[2,8,9,12] The double-incision fasciotomy technique is more commonly used. The single-incision technique is more technically challenging and can result in incomplete decompression if not performed correctly.[2] Additionally, factors like the timing of compartment syndrome diagnosis and fracture morphology, may significantly impact surgical results and must be taken into consideration.

Increased difficulty of obtaining access to and adequately releasing the deep posterior compartment in addition to the increased operative time is often listed as the main criticism of single-incision fasciotomy.[5] However, none of the 11 studies highlighted in our review encountered inadequate release of posterior deep compartment. Furthermore, Neal et al. simulated ACS in eight-paired human cadaver legs. The specimens were pressurized with saline and contrast in all four-compartments with sustainable compartment pressures exceeding 60 mmHg.[3] This study examined the efficacy of single and double-incision fasciotomies and evaluated the techniques' ability to adequately decompress all four-compartments in the leg. The authors chose to complete a side-by-side comparison because there were recent retrospective reviews of tibia fractures that challenged whether single-incision fasciotomy was advantageous in terms of reducing the potential for stripping of tissues in a compromised tibia. It was argued in these reviews that single-incision fasciotomy did not require an additional incision over the subcutaneous tibial border and prevented the unnecessary formation of a skin bridge over the anteromedial portion of the tibia.[3] Hoping to determine whether deep posterior compartment could be adequately released through single-incision fasciotomy, the authors decided to use a cadaveric model to directly evaluate the efficacy of the two fasciotomy techniques and tested the ability to recreate ACS in the deep posterior compartment after fasciotomy.[3] Post-fasciotomy, the compartment pressures were measured to be less than 30 mmHg in both intervention groups and there was no reported statistically significant difference in post-release pressures in any of the four compartments in the leg. In the deep posterior compartment, the mean post-release pressure was 4.6 mmHg with single-incision fasciotomy and 5.6 mmHg with double-incision technique.[3] While the double-incision technique proved to be efficacious, there were marked disadvantages including potential devascularization of the tibia due to release of the soleus muscle to allow for release of the deep posterior compartment and additional open wound in the anteromedial section of the tibia. The surgical impact of an extra incision in the soft tissue could negatively impact the blood supply and structures of the tibia in fracture healing. The authors admitted that in the cadaveric model, it was challenging to fully replicate in vivo scenarios however, they confirmed through the model that single-incision four-compartment fasciotomy was just as effective as double-incision technique for sufficient pressure release in cases of ACS.[3]

There are select advantages of this limited incision technique such as less cosmetic impact on the region and reduced risk of soft tissue injury to the medial aspect of the leg by avoiding an incision at that location. Overall, when the single-incision technique has been used to treat ACS, it has shown to reliably decompress all impacted compartments with minimal complications and is acknowledged to be an effective approach for most four-compartment fasciotomies.[3,13]

Overall, the single-incision fasciotomy is more nuanced, making it a more technically-challenging approach to decompression of ACS. It is less commonly performed. As a result, the surgeon using this technique must be familiar with this approach. Without the requisite surgical expertise, there is a higher chance of incomplete release and related nerve injury when implementing this technique.[4] As of 1992, the double-incision fasciotomy has been the "most widely used" technique for leg four quadrant fasciotomies. An important reason for this could be that it tends to be the quicker and less technical technique between the two.

5. Limitations

There are inherent limitations to our study. First, the data and conclusions from this systematic review is limited by the quality of the studies included in our analysis. It is worth noting that only a few of the studies included in our analysis were able to provide high-quality data with large patient populations. Additionally, there was significant variability in the reported patient demographic including diagnosis criteria, operative indications, surgical techniques, follow-up time, and outcome measures. Furthermore, most of our studies were retrospective studies, which introduces the possibility of recall and selection bias. Future studies should focus on standardizing diagnostic criteria for ACS and treatment modalities. Additionally, future prospective studies should include paired or randomized trials with large patient populations.

6. Conclusion

Single and double-incision fasciotomies in the primary operative management of lower-extremity ACS are established and reliable methods of achieving adequate compartment decompression with little to no complications when performed in a timely manner. While double-incision fasciotomy is the more commonly performed surgical technique, its efficacy relative to the single-incision technique is comparable. Certain factors such as operative timing, surgeon familiarity, fixation strategies and closure techniques significantly influence patient outcomes. These findings may be used to guide the orthopedic community when determining the optimal incision-type to use in acute compartment syndrome emergencies for lower-extremity fracture cases in conjunction with closure and fixation techniques.

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Authors contribution

Ali Etemad-Rezaie MD, MS – Data collection, writing of the manuscript and submission.

Sophia Yang BS – Data collection and methods.

Marit Kirklys BS—Data collection and Methods.

Devan O. Higginbotham MD-Methods, Discussion and manuscript editing.

Abdul K. Zalikha MD- Methods, Discussion and manuscript editing.

Kerellos Nasr MD- Discussion and manuscript editing.

Study (year of publication)	Intervention	Number of Patients	Study Methods	Key Findings and Comments
Bible et al. (2013)	single and dual-incision techniques, tibial fixation with fasciotomy for ACS	175	Retrospective review of all adult tibial fractures treated over a 12-year period. Measured occurrence of postoperative infection and nonunion.	Results from both fasciotomies were similar across infection and non-union outcomes ($P > 0.5$). Fasciotomy technique should be selected based on surgeon experience or condition of patient rather than suspected elevated infection or nonunion rate with either technique.
Thabet et al. (2017)	1 case of single-incision technique, all the rest underwent double-incision fasciotomy with delayed definitive fixation	221	Retrospective chart review of patients of ACS of lower extremity presenting with tibial plateau fractures from a level I trauma center between 2010 and 2016. Measured rate of infection, delayed union, and nonunion.	Infection rate, incidence of delayed union or nonunion of tibial plateau fractures were found to be lower than in other published studies. Timely decompression through double or single-incision fasciotomy does not elevate the risk of these complications.
Chang et al. (2020)	single-incision technique + VAC	11	Retrospective study, patients treated for ACS during a 3-year period by single surgeon. Measured incidence of malunion, infection, neurovascular injury, neurologic deficits (adequate release of compartments), need for skin graftings.	No instances of malunion, infection, neurovascular injury and progressive neurologic deficits. All patients were closed primarily with no need for skin grafting, time to primary closure of 4.5 days. 1 Tibial fracture nonunion and 1 distal wound breakdown, healed by secondary intention. Single-incision approach with protocolized skin closure is safe and effective, reducing need for skin grafting.
Maheshwari et al. (2008)	single-incision technique without fibulectomy	56	Retrospective study, identified 58 leg fasciotomies performed on 56 patients with tibial shaft fractures classified as AO/OTA 42 (2 required bilateral) from 1999 to 2005. Measured death, need for surgical debridement, inadequate decompression, treatment of symptomatic deformities	The deep posterior compartment of the leg can be identified and adequately released while using the single-incision technique. There was no case of inadequate compartment release, nor was any leg identified as having an inadequate release on subsequent debridements or at the time of wound closure.
Hak et al. (1994)	single-incision technique, unreamed locked intramedullary nail	12	Retrospective clinical review, 6 closed fractures, 3 grade I and 3 grade II open fractures. Measured evidence of neurologic deficit, deformities, infections, time to union, time to fracture healing	Ten fractures achieved union without shortening or significant angulation at an average follow-up of 8.1 months (range 4–26). No superficial or deep infections. All patients obtained an excellent range of motion of the knee and ankle. One case with treatment delay >12 h post-injury has a persistent neurologic deficit with a claw toe deformity. Unreamed tibial nail combined with lateral single-incision technique permits optimal treatment in fracture and soft-tissue injuries.
Krticka et al. (2016)	single-incision technique, negative pressure wound therapy (NPWT), elastic dynamic suture	64	Retrospective study, 2008–2015, patients with traumatic lower leg injuries with ACS. 56 fracture cases. Measured infectious complications, time to wound closure, muscle necrosis, osteomyelitis.	No significant difference in median time to wound closure for control and study groups. Mean number of dressing changes is higher in control group. Number of infectious complications of fasciotomy wounds similar in both groups and all patients were successfully treated with antibiotics and therapy. Combined technique of NPWT with elastic dynamic ligature is a safe method of fasciotomy wound closure and is more advantageous than traditional methods. Higher rate of complete Fasciotomy wound sutures and decreased time of hospitalization allows for earlier rehabilitation and higher patient satisfaction.
Goyal et al. (2017)	single and double-incision technique	30	Clinical study, 32 tibial fractures with ACS evaluated and deep posterior compartment pressure measured. 30 patients underwent urgent fasciotomy, 15 single-incision cases, 15 double-incision cases. Surgical fixation perfumed until the fasciotomy wound was healthy. Followed up to 1 year. Measured functional outcome using lower extremity functional scale (LEFS) and complications	No difference was found in single-incision and double-incision fasciotomy on LEFS. Intra-compartment pressure (ICP) correlated with functional disability as patients with higher ICP were likely to have poor functional outcome.
Erdös et al. (2011)	single-incision and double-incision technique	24	Retrospective study in children, mean age 12.9 years.[2–20] Measured admission to fasciotomy based on clinical presentation, persistent contractures, number of operations until definitive wound closure, complications.	Patients underwent fasciotomy with a median 27.5 h (2.5–00). Persistent contractures occurred in one of 23 patients (4.2%). Indication for open fasciotomy is clear even in infants and requires rapid treatment decisions. Only in 1 case, double-incision fasciotomy is required due to clinical evidence of residual tightness of compartments after lateral incision is made. A single-incision lateral technique allowed for adequate decompression in all other cases.
DeLee et al. (1981)	single and double-incision technique	104	Retrospective study, patients with open tibia fractures, 6 patients developed compartment syndromes involved all 4 compartments of lower leg, 4 cases after initial debridement and reduction. 1 patient had decompression through single incision fasciotomy. Measured adequate	Union was delayed over six months in all cases with follow-up. No amputations indicated. Double fasciotomy incision allows for adequate decompression but results in marked loss of soft tissue support for fracture. Soft tissue loss from necrosis in 4 cases resulted in multiple

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Study (year of publication)	Intervention	Number of Patients	Study Methods	Key Findings and Comments
			decompression and need for soft tissue support post-surgery.	debridements and ankle stiffness. Single-incision technique is recommended for compartmental decompression to sustain stability. Soft tissue loss and fasciotomy are contributors to delayed healing.
Heemskerk et al. (2003)	single and double-incision technique	40	Retrospective review, 19 cases single incision, 7 cases using dual-incision technique. Measured mortality, morbidity, nerve damage and limb function	No correlation between causative factors and clinical outcome. Only significant predictive factor was patient age. Fasciotomy technique has no significant correlation with outcome. Age, sex, cause of the compartment syndrome, and technique of fasciotomy did not predict hematoma. Nerve damage was seen more commonly after the open single-incision technique than after fasciotomy using the other techniques ($p = 0.046$). Other factors did not predict nerve damage. Skin wound management technique did not significantly correlate with wound infections.
Wiger et al. (1998)	single-incision technique	12	Prospective experimental study with an unbiased observer, patients with ACS treated with fasciotomy, early postoperative edema reduction, and secondary wound closure on the third or fourth day. Syndrome confirmed with measurements of intramuscular pressure (IMP), not allowed to >30 mmHg. 7 patients had fractures of tibia and fibula. Measured wound closure, ischemic contracture and patient safety data points.	Local perfusion pressure remained above 50 mmHg in all cases. Distance between skin edges did not surpass 0.5 cm in any patient by 11th day. No patient needed skin graft and no signs of ischemic contracture at follow-up. Secondary wound closure starting on the 3rd day post-single-incision fasciotomy is a safe method to perform on normotensive patients if IMP does not exceed 30 mmHg.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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