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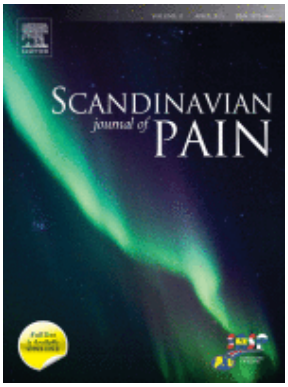

Prevalence of chronic compartment syndrome of the legs: Implications for clinical diagnostic criteria and therapy

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Running Title: Prevalence of Compartment syndrome

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Abstract

Introduction: Poorly defined musculoskeletal disorders are a common clinical problem and have considerable psychosocial impact. Chronic compartment syndrome (CCS) of the legs has primarily been noted in young athletes and soldiers. The epidemiology of CCS in the general population has not been studied previously. The aim of this study was to establish the prevalence of CCS of the legs in the general population and to study its association with possible etiological factors.

Methods: A two-stage population survey was performed, using a questionnaire followed by clinical examination. A sample of 3000 individuals aged 25-75 years was randomly selected from the general population. A clinical examination was offered to those answering "Yes" to the following question: "Do you wake up at nights due to leg pains or cramps, causing you to walk around?" Intracompartmental pressures in the leg were measured in 13 persons randomly selected from among those diagnosed with CCS after the clinical examination.

Results: Of the 3000 persons contacted, 2308 (76.9%) responders were included in the study. Leg pain or cramps at night was reported by 24% of the respondents. Age, rheumatic disease, use of hormone medication, heart failure, leg oedema, and peripheral arterial disease were all significantly associated with leg pain or cramps ($P < 0.05$). Among 286 persons with leg pain who underwent a subsequent clinical examination, 91 persons (31.9%) were classified as definite CCS. This suggests a CCS prevalence of 7.6% in the total sample ([24% x 31.9%/100]). In 13 of the individuals with CCS intracompartmental pressure was measured before and after performance of the step test exercise. One individual had a post-exercise pressure >15 mmHg. None had post-exercise pressure past the conventional threshold of >30 mmHg.

Conclusion: Nocturnal leg pain or cramps is a common symptom. A significant part of the general population (7.6%) may have CCS of the legs, with symptoms ranging from very mild to severe.

Implications: Considering the high prevalence of CCS found in this study, it is likely that a large proportion of those presenting with muscular pain actually have CCS. These persons are usually advised to increase their physical training to achieve some degree of pain relief. However, CCS patients may instead experience both increased leg pain and a proximal myalgia, which is possibly a referred pain. A demanding “gold standard” test (requiring identification of elevated of intracompartmental pressures), unclear diagnostic criteria, poor long-term results from incomplete surgery, and an uncertain explanation for what may be termed referred pain seem to have delayed the acceptance of CCS as a common cause of leg pain/cramps and numbness. At the same time, the enormous costs to society and the reduced quality of life of patients require that such disease entities are correctly diagnosed as they can be effectively treated by simple, low-risk surgical procedures.

Keywords: Chronic compartment syndrome, prevalence, leg pain, leg cramps

Introduction

Musculoskeletal disorders have a large impact on societies worldwide, yet are underdiagnosed and undertreated [1-3]. Poorly defined forms of musculoskeletal disorders, such as low back pain and some upper extremity syndromes, are common in clinical practice [4-7]. Many population-based studies of these conditions do not have clearly defined diagnostic criteria, but are based on global or whole-limb estimates of pain and reduced function [7-9]. While these studies serve to highlight the importance of musculoskeletal disorders, the diagnostic groups are not always helpful to the clinician. Therefore, there is a need to study the prevalence of precisely defined clinical entities.

Surgeons regularly come across the acute forms of compartment syndrome in fractures, crush injuries, and vascular catastrophes. The first known description of chronic anterior compartment syndrome was given by Wilson in 1912 [10]. In his diary from the Scott expedition, he describes this condition in himself on his way back from the South Pole. The first scientific report was given by Vogt in 1943 [11], and the first monograph was presented by Renemann in 1975 [12]. Typically, in the compartment syndrome, a claudication-like pain is experienced after walking or running, which means that symptoms worsen following physical activity [11, 12]. The entity has mostly been found in young soldiers [12] and is clinically well described in athletes [13-16].

The nerve entrapment disorders comprise an important part of soft-tissue musculoskeletal disorders. Carpal tunnel syndrome is perhaps the best known. Its prevalence has been reported to be 3.8% in the general population [17], though the majority of cases are not medically diagnosed. However, only 70% of those with carpal tunnel syndrome had median nerve neuropathy on electrophysiological examination. In asymptomatic controls, median nerve neuropathy was found in 18% of persons, with prevalence increasing with age. It seems

a paradox that tarsal tunnel syndrome, the equivalent in the foot to carpal tunnel syndrome in the hand, is frequently conceived as plantar fasciitis despite that the sensitivity in the sole of the foot is supposed to be reduced in the first and normal in the latter. Although peripheral nerves are compressed in chronic compartment syndrome (CCS)—as shown by the reduction of skin sensitivity in distribution of the nervus fibularis superficialis, the nervus fibularis profundus, and the nervus suralis—the nerve compression in CCS of the leg has traditionally not been viewed as a peripheral nerve entrapment syndrome.

No studies have investigated the prevalence of CCS in the general population. With the present study we aimed to establish the prevalence of CCS of the legs in a general population. We performed a two-stage population survey. A questionnaire to collect background information was followed by clinical examination in a subset of the sample and intracompartmental pressure measurements in a further subset. The pressure measurement results in the present study were equivalent to the results in a recent study [18], indicating that a thorough clinical examination could be preferred instead of the previous "gold standard" requiring intracompartmental pressure measurements before and after exercise [19].

Methods

Population and sampling

We performed this cross-sectional study in the county of Sogn and Fjordane, Norway. The study was approved both by the Regional Ethical Committee of Western Norway (REK III 050.02) and by the Central Bureau of Statistics, Norway (June 13th 2002). Financial support was provided by the University of Bergen.

The sampling frame was all individuals aged 25-75 years listed in the Central Population Register of Norway as on June 25th 2002. From the total population of 107280, a random

sample of 3000 participants, stratified by gender, was selected. A one-page postal questionnaire with pre-paid return postage was mailed to each of the selected individuals. Two reminders were sent to nonresponders.

Questionnaire

The questionnaire contained questions related to musculoskeletal pains in the extremities, and possible hormonal, circulatory, and rheumatic risk factors. The question "Do you wake up at nights due to leg pains or cramps, causing you to get out of bed and walk around?" (Yes/No) was used to screen respondents. Respondents who answered “Yes” to this question (*n* = 551) were contacted by phone and offered a thorough neuro-orthopaedic examination.

Clinical examination

Those who were contacted were informed that in addition to the clinical examination there was the possibility of being selected for intracompartmental pressure measurements, and consent for the same was obtained. The clinical examination, conducted by two of the co-authors (HUI and IHL), was focused on the spine, hip, lower leg, and foot, and included palpation of lower extremity arteries and a thorough neurological examination [18]. Our diagnostic criteria required the presence of tenderness upon palpation of the compartments, along with decreased sensitivity in the distribution of one or both rami of the fibular nerve and/or the tibial nerve.

The participants were also asked to complete a questionnaire seeking detailed description of their leg pain. The provocative exercise, a step test exercise, was performed as follows: participants were asked to perform a “walking on the spot” motion, by quickly alternating between standing on the heels and on the toes. Skin sensitivity over the dermatomes in the lower extremities was tested before and after the exercise.

Diagnostic criteria

The participants were classified into three groups: definite compartment syndrome, possible compartment syndrome, and others (not compartment syndrome). Classification was based on the following criteria:

1. Definite compartment syndrome:
    a) Extensive leg pain before testing or extensive leg pain within 3 minutes of starting the step exercise.
    b) Accompanying hypaesthesia to pinprick and cotton-wool stimulation in the skin innervated by the nervus fibularis profundus (anterior compartment), nervus fibularis superficialis (lateral compartment), and nervus suralis (superficial posterior compartment).
    c) Normal dermatomal somatosensory functions above the knee (examined by sensitivity to both pinprick and cotton-wool stimulation).
2. Possible compartment syndrome:
    a) Same type of leg pain as described above, but without reduced sensitivity in the distribution of any of the three peripheral nerves.
3. Not compartment syndrome:
    a) Leg pain with other obvious cause (e.g., arteriosclerosis, neurological disease).

Measurement of intracompartmental pressure

From among those with definite compartment syndrome, 13 participants were randomly selected for measurement of intracompartmental pressure before and after the step test exercise. Interstitial pressure was measured by the “wick-in-needle” technique [20-22]. The method is based on fluid equilibrium between a pressure transducer and the interstitium. Hypodermic needles (0.8 mm OD, 40 mm length) with a 4-mm side hole approximately 7 mm from the tip were used. The needles were filled with cotton thread and sterilised by

autoclaving. The thread serves to provide a continuous water connection between the tissue and the needle lumen. The needle was connected to a pressure transducer (Gould Statham P23 ID) via a polyethylene tube (Portex manometer line, 60 cm, 200/490/060). The catheter–transducer system was filled with normal saline. To prevent leakage, the original dome was replaced by a Perspex dome with a single outlet and a rubber O-ring as a seal against the transducer. The pressure transducer had a volume displacement of 0.04 µL/100 mmHg, and the compliance of the total measuring system was 0.7 µL/100 mmHg. The signal was fed via an analogue-to-digital converter (Periflux PF 472, Perimed AB, Järfalla, Sweden, www.perimed.se) to a personal computer. PeriSoft for Windows software (Perimed AB) was used for recording and analysis of data. This software allows changes in timescale (x-axis) and signal amplification (y-axis) to facilitate the analysis of the interstitial pressure.

Following a resting period of at least 30 minutes, the participant was asked to perform the step test exercise until exhaustion. The interstitial fluid hydrostatic pressure in the anterior and posterior compartments of the leg were recorded, both at rest and after exercise. Pressure was measured with the participant lying down. The needle was inserted in the calf at the level of the greatest diameter, and the pressure was recorded until a stable, horizontal line was seen on the monitor (within 2-10 minutes). The patency of the fluid phase between the interstitium and the needle lumen was checked by slight compression and decompression of the polyethylene catheter by means of a 10-mm-wide screw clamp to create an upward and downward pressure deflection of approximately 5 mmHg [20]. If the pressures returned to the original values, usually within a few minutes, the pressure recordings were accepted.

Statistical analysis

Statistical analyses were performed using IBM SPSS version 21. $P \leq 0.05$ was considered significant. Categorical variables were described using the numbers and percentages. Odds

ratios comparing groups were computed with logistic regression. The probable prevalence of CCS was calculated by the following formula: (percentage of the whole sample reporting leg pains or cramps, multiplied by the percentage of the examined persons with certain CCS, divided by 100).

Results

Altogether, 78% (2341/3000) of those selected from the register returned the postal questionnaire. Eight persons were disabled or dead, 25 persons had changed address and could not be reached. Finally, 76.9% of those contacted (2308/3000) were enrolled in the study; 52.6% were women and 47.4% were men. The flow of the study is presented in Table 1.

The prevalence of night-time leg pain or cramps in the sample was 24% (553/2308) (Tables 1 and 2). A positive association was found between night-time leg pain or cramps and age, rheumatic disease, use of hormone medication, heart failure, leg oedema, and peripheral arterial disease (Table 3). The responses in the questionnaire revealed that 522 persons had experienced leg pain as children; in 16.6% (87/522), the pain, usually termed growing pain, had continued into adulthood.

Among the 286 persons with leg pain or cramps attending a subsequent clinical examination, 91 persons were classified as definite CCS and 107 as possible CCS. Thus, this study suggests a population prevalence of 7.6% of CCS ([24% x 31.9%/100]). Using the same independent variables as in Table 3 in a multivariate analysis, only female gender was positively associated with CCS (OR = 2.8; 95% CI, 1.5-3.1). Only one out of 13 persons with CCS had post-exercise intracompartmental pressure of more than 15 mmHg (Table 4). No person had a pressure reading above 30 mmHg.

Discussion

Principal findings

This is, as far as we know, the first population-based study on the prevalence of CCS of the legs. Night-time leg pain or cramps was seen in 24% of our sample, and 7.6% may have CCS of the legs, with symptoms ranging from very mild to severe.

Strengths and weaknesses

The response rate to the questionnaire and the physical examination was relatively good, so a nonresponse bias is unlikely in this study.

No standardized questionnaire for this condition is available. The questionnaires used in other studies in literature [17, 23] have been oriented towards the total burden of musculoskeletal disorders and conditions of the hands. We used the qualification of sleep disruption to identify patients with severe symptoms. An interesting example is sciatic pain, a syndrome much better delineated epidemiologically and clinically than CCS. Both the lifetime prevalence and the point prevalence of typical sciatic pain are surprisingly high [24].

Finally, we must add that there may have been a selection bias, as participants were offered the option of undergoing the clinical examination. There is no way of knowing whether the examined persons had more leg pains that those who were not examined. Thus, there is a chance that the prevalence of CCS in this study is slightly overestimated. If, for example, CCS had been diagnosed in only 21.1% rather than 31.9% of the persons who underwent the clinical examination (2/3 of the findings of this study), the estimated prevalence of CCS would have been 5.1% ([24 × 21.2]/100).

One the other hand, the fact that many of the patients with CCS stated that they had experienced symptoms since childhood suggests that if we had included participants from younger age groups we might have found a higher total prevalence of CCS.

Diagnosis

CCS is likely underdiagnosed when the gold standard criteria, requiring increased pressures in the compartments, are followed. Many patients suffer from CCS but go undiagnosed. The population seeking medical treatment probably represents the tip of the iceberg, presenting at the clinic because of higher degrees of functional impairment [23].

In comparison with dermatome sensitivity above the knee, the changes in sensitivity of each peripheral nerve of the leg and foot seem related to the compartmental pain and signal a need for volume expansion. The sensitivity changes caused by CCS can be discriminated from the polyneuropathy pattern (progressively ascending symmetrical loss of sensitivity starting peripherally) and from the pattern in other conditions.

The clinical examination in this study was oriented towards CCS, but this should only be seen as a screening process. We could only exclude cases that clearly had a different aetiology, but misclassification of other cases cannot be ruled out. Subclinical early neuropathy or subclinical sequelae of sciatica are two examples. On the other hand, CCS of the legs is usually not regarded as an option to explain nonspecific peripheral neuritis. Nonspecific neuritis, polyneuritis, diabetic neuropathy, and spinal lesions as well as restless legs syndrome (RLS) must be excluded before CCS can be confirmed. Patients suffering from RLS also suffer from nightly leg pains but, in contrast to CCS, they do not experience reduced sensitivity as a result of peripheral nerve entrapment. In discussions with neurologists, the question has been raised if RLS possibly may represent a first stage of CCS, but a conclusion has not been reached. The addition of neurophysiological studies (e.g., EMG/NCV) could have helped exclude other clinical and subclinical diseases, but this was not feasible because of cost considerations.

Neurophysiological examinations

It might appear paradoxical that normal results from electrophysiological examination are reported in cases with clinical loss of sensitivity [18]. This calls for some explanation. In acute

as well as chronic pain, both C-fibres and A-delta fibres (the thinnest myelinated small fibres and small and unmyelinated nerve fibres usually are affected. Small fibres cannot be assessed by EMG/NCS. When the sense of touch is diminished, as is frequently the case with these patients, one would expect an effect on myelinated fibres (A-beta) as opposed to motor efferent (A-alfa) fibres. This would lead to reduced nerve conduction. The problem is that a wide range of normal values exists for the standard parameter of nerve conduction. Thus, electrophysiological examination has a relatively low sensitivity in demonstrating pathological changes.

Invasive pressure measurements

It is unfortunate that we were unable to perform post-exercise compartmental pressure measurements in a larger group, but that is the very reason why the present study had to await the publication of a larger material examined by pressure measurements [18]. It seems strange that pressure measurements have gained status as a gold standard, considering the controversies surrounding cutoff points [19]. Normal intracompartmental pressures are considered to be below 10-15 mmHg. Many authorities consider pressures above 15 mmHg as suspicious of CCS [25, 26], while some demand pressures above 30 mmHg for a diagnosis of CCS [27]. However, some patients with pressures between 10 mmHg and 15 mmHg also have pressure-related symptoms [28]. Acceptance of that criteria could substantially increase the true prevalence of the condition. However, as we did not perform pressure measurements in asymptomatic persons, we cannot present an estimate of the prevalence of asymptomatic increased compartmental pressures.

Invasive pressure measurements are cumbersome to perform and are often not available. There is considerable interest in the development of alternative diagnostic tests, for example, MRI [23]. In this study, a detailed clinical examination followed by the step test exercise could

identify a subset of patients with relatively high likelihood of CCS. A recommendation for a standardized clinical examination of these patients was published recently, and its use could more precisely identify people at high risk of CCS [18].

To better delineate compartment syndromes, randomized controlled trials are needed at various levels of intracompartmental pressures to study the effect of surgical intervention. This is analogous to the development of hypertension as a disease entity. For decades, cardiologists treated cardiovascular disease on the basis of animal studies, case reports, and clinical impressions. Not until longitudinal studies were performed did hypertension or isolated systolic hypertension, ventricular hypertrophy, atrial fibrillation and cardiac failure predict myocardial infarction [29]. Our study can be seen as a first step in this process.

Conclusions

We have shown that a substantial proportion of lower extremity symptoms are likely to be caused by chronic exertional compartment syndrome of the legs. Our data support a recent study [18] that found that 1) CCS is not restricted to athletes and physically active persons. As our study showed, some participants had symptoms from childhood (when it was considered as growing pains); 2) bilateral CCS is related to the oedema caused by rheumatic diseases, heart failure, and medication with hormones (40%-50% in our sample; Table 2). The relatively high prevalence of CCS found in our study shows that further study of this entity in poorly understood chronic musculoskeletal pain could be enlightening. To conclude, our study suggests a prevalence of CCS of 7.6% in the general population.

Implications

Adverse effect of physical activity

Considering the high prevalence of CCS found in this study, it is likely that a large proportion of those presenting with muscular pain actually have CCS. Most patients suffering from

muscular pain of uncertain origin are advised to increase their physical training to achieve pain relief. However, patients with CCS may experience both increase in pain in the legs and increase in referred muscular pain, the latter of uncertain aetiology. Children and adults alike may become unable to participate in common physical activities down to walking to school, resulting in isolation and depression. The modest and low-risk surgery for CCS has the potential of turning the situation around: a few days after surgery patients may be able to participate in all common activities [30]. Furthermore, improvement in quality of life may be accompanied by public savings of about 3.2 million US dollars or 20 million NOK (Norwegian Kroner) which for one person is the estimated difference between receiving an inability pension from the age of 20 and working full time until the retirement age of 67 [31].

Diagnostic criteria

The unclear criteria for diagnosis of CCS and a poor reputation of long-term results from surgery have diminished the attention given to CCS. New diagnostic criteria for diagnosis of CCS require the presence of compartmental tenderness upon palpation plus decreased sensitivity in the area supplied by one or both rami of the fibular nerve and/or the sural nerve [18]. If these signs are absent during rest, an exertional step test can be done to provoke them. Frequently, a distinct tenderness is initially present in only one anterior leg compartment, but may occur in all compartments after the step test exercise. Often, the anticipated referred pain, as depicted in pain drawings, extends towards the knee, hip, and lumbar region.

Differential diagnoses

The sensitivity of dermatomes proximal to the knee must be compared to that of the areas supplied by the peripheral nerves of the leg and forefoot. It is necessary to discriminate between CCS and L5 nerve root impingement as the cause of tender muscles and pain in the anterior compartment, and to separate from CCS the frequently coexisting tarsal tunnel

syndrome. Tarsal tunnel syndrome causes local pain and cramps in the plantar muscles and is characterized by reduced sensitivity in the sole of the foot in contrast to plantar fasciitis in which sensitivity is supposed to be normal. Other differential diagnoses (enumerated in the Discussion section) must be eliminated as well. Both neurophysiological methods and high-resolution sonography can aid diagnosis [32].

Intra-compartmental pressures

No correlation has been found between the degree of intracompartmental pressure rise and pain [18]. Yet critics have questioned the termination of pressure measurement as the gold standard, but that "gold standard" has indeed prevented everyone from performing surgery extensively enough to achieve permanent pain relief [18]. Fasciotomy in all four leg compartments has been practiced from 2007 [18] and has provided permanent pain relief to many, with reoperation rarely being indicated. The present surgical method of using small skin incisions, however, appears more acceptable.

Etiology

According to our clinical experience, unilateral CCS is often caused by previous trauma and rarely by deep vein thrombosis; however, the present study (as also a recent study [18]) has shown that bilateral CCS in 40%-50% is associated with oedema related to hormone medication. CCS is also sometimes seen in pregnancy [30]. CCS as a cause of pain may also be seen in other settings, as for example leg cramps accompanying the dependant oedema caused by heart failure. Persistent leg pain after lumbar disc surgery is well known, but the prevalence of CCS in this study suggests that CCS may be a far more frequent cause of the pain than arachnoiditis. Furthermore, CCS patients often have nocturnal leg pain and cramps, and many have to get out of bed and walk about for relief. Therefore the possibility of CCS should be considered in patients with sleep disorders. Different degrees of pain in the four leg

compartments may also result in imbalance of muscular function. Following fasciotomy of the legs,normalization of unclear ankle and foot distortion has been observed. In some patients suffering from digitigrade, without cerebral palsy, the heels have “come down” and has made construction of extra shoe-heels redundant .

Perhaps the most surprising finding in this study was that a large number of participants said that what was diagnosed as growing pains of childhood had continued into adulthood. Many of these patients have been operated on for CCS after 2007 and have reported unquestionable improvement [18].

It is helpful to consider CCS as a peripheral nerve entrapment syndrome, with pain and typical accompanying sensitivity changes or numbness. With pain drawings sometimes covering the entire body, it can be challenging to break down a complicated pain picture into different components of pain and referred pain caused by the entrapment of multiple peripheral nerves, conditions which may effectively be treated one by one by simple low-risk surgical procedures.

Conflict of interest

The authors declare no conflicts of interest.

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Table 1. Study flow.

Stages	Descriptions
1.	3000 persons were invited.
2.	2308 of these 3000 persons (76.9%) participated.
3.	553 of these 2308 (24.0%) persons had leg pains or cramps at night.
4.	551 of these 553 persons (99.6%) were invited to a clinical examination.
5.	286 of these 551 persons (51.9%) underwent the clinical examination.
6.	91 of these 286 persons (31.8%) had CCS according to the diagnostic criteria, suggesting a population prevalence of 7.6% ([24.0% × 31.8%]/100).
7.	13 of the 91 persons with CCS (14.3%) underwent intracompartmental pressure measurements.
8.	1 of these persons (7.7%) had increased intracompartmental pressure.

Table 2. Characteristics of the study participants (*N* = 2308)

Variables	*n* (%)	Leg pains at night *n* (%)
Age, years		
25-39	828 (35.9%)	131 (15.8%)
40-59	1067 (46.2%)	271 (25.4%)
60-75	413 (17.9%)	151 (36.6%)
Gender		
Men	1093 (52.6%)	228 (20.9%)
Women	1215 (47.4%)	325 (26.7%)
Rheumatic disease		
No	2008 (87.0%)	413 (23.1%)
Yes	300 (13.0%)	140 (46.7%)
Use of hormone medication		
No	2230 (96.6%)	516 (23.1%)
Yes	78 (3.4%)	37 (47.4%)
Diabetes		
No	2229 (96.6%)	525 (23.6%)
Yes	79 (3.4%)	28 (35.4%)
Heart failure		
No	2259 (97.9%)	528 (23.4%)
Yes	49 (2.1%)	25 (51.0%)
Leg oedema		
No	2083 (90.3%)	425 (20.4%)
Yes	225 (9.7%)	128 (56.9%)
Peripheral arterial disease		
No	2227 (96.5%)	512 (23.0%)
Yes	81 (3.5%)	41 (50.6%)

Table 3. Logistic regression analysis with leg pain at night as the dependent variable (*n* = 553 of 2308)

	Odds ratio (95% CI)	
Independent variables	Unadjusted	Adjusted
Age, years		
25-39	Ref.	Ref.
40-59	1.8 (1.4, 2.3)	1.6 (1.2, 2.8)
60-75	3.1 (2.3, 4.0)	2.1 (1.5, 2.8)
Gender		
Men	Ref.	Ref.
Women	1.4 (1.1, 1.7)	1.1 (0.9, 1.4)
Rheumatic disease		
No	Ref.	Ref.
Yes	3.4 (2.6, 4.3)	2.5 (1.9, 3.3)
Use of hormone medication		
No	Ref.	Ref.
Yes	3.0 (1.9, 4.7)	2.0 (1.2, 3.3)
Diabetes		
No	Ref.	Ref.
Yes	1.8 (1.1, 2.9)	1.1 (0.6, 1.8)
Heart failure		
No	Ref.	Ref.
Yes	3.4 (1.9, 6.0)	2.0 (1.1, 3.7)
Leg oedema		
No	Ref.	Ref.
Yes	5.2 (3.9, 6,9)	3.6 (2.6, 5.0)
Peripheral arterial disease		
No	Ref.	Ref.
Yes	3.4 (2.2, 5.4)	1.8, (1.1, 2.9)

Table 4. Intracompartmental pressure measurements in 13 persons randomly selected from among the 91 persons with symptoms and clinical findings suggestive of chronic compartment syndrome of the lower extremities

	Anterior compartment			Posterior compartment		
Patient #	Before	After	Change	Before	After	Change
1	6.7	15.4	8.7	3.7	15.0	11.3
2	−2.4	8.1	10.5	3.0	9.6	6.6
3	--	--		6.0	6.0	0.0
4	2.5	4.5	2.0	5.0	14.9	9.9
5	7.4	4.0	−3.4	5.8	7.8	2.0
6	−6.3	1.2	7.5	-6.0	8.0	14.0
7	0.0	1.5	1.5	0.0	5.9	5.9
8	4.0	3.8	−0.2	0.0	−0.4	−0.4
9	0.5	3.5	3.0	13.0	8.5	−4.5
10	−2.0	2.5	4.5	−2.0	−3.0	−1.0
11	−8.0	−0.7	7.3	−3.5	0.0	3.5
12	1.3	−0.7	−2.0	1.8	-0.5	−2.3
13	10.0	4.2	−5.8	7.0	10.2	3.2
Mean	1.1	3.9	2.8	2.6	6.3	3.7
Median	0.9	3.7	2.5	3.0	7.8	3.2