Contraindications - the VADOplex is contraindicated for patients where an increase of fluid to the heart may be detrimental, including some patients with congestive heart failure and those with pre-existing deep vein thrombosis, thrombophlebitis or pulmonary embolism. The device should be used with caution on the infected or insensitive extremity.

Summary
Clinical Review I
Abstracts Reference
Prevention of Deep Vein Thrombosis, Oedema-Management and Pulmonary Embolism
PREVENTION AND TREATMENT OF VENOUS THROMBOEMBOLISM INTERNATIONAL CONSENSUS STATEMENT 2013

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CHAIRMAN OF EDITORIAL COMMITTEE: A.N NICOLAIDES

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Overall Recommendations

"Combined modalities (IPC and pharmacological prophylaxis) should be considered in all high risk surgical patients (level of evidence: high)."

"Individual recommendations for specific groups of patients appear in the relevant sections of this document."

"GEC is contraindicated in patients with peripheral arterial disease because of anecodal reports of gangrene."

"Despite conventional anticoagulation therapy (LMWH for five days followed by warfarin), 30–50 % of patients with DVT will develop the postthrombotic syndrome (PTS)"

"Recommendations for prophylaxis in this group consist of the use of IPC in all patients with or without GEC stockings (level of evidence: high)."

\[...\]

Multiple Trauma

"LMWH starting as soon as bleeding risk is acceptable (level of evidence: high) or IPC in the presence of contraindications to LMWH (level of evidence: high) and continued until full ambulation."

"IPC and FIT offer an alternative for patients with contraindications to chemical prophylaxis."

Orthopedic surgery and trauma

"IPC and FIT offer an alternative for patients with contraindications to chemical prophylaxis."

General, vascular, bariatric and plastic surgical patients

"LMWH was still associated with an increased risk of bleeding."

"RCT show that combinations of prophylactic methods are more effective than using each method singly."
The concept of minimizing the venous risk in order to reduce the risk of development of deep vein thrombosis (DVT) is commonly accepted and sufficiently proven by clinical evidence. However, the ideal setting and frequency, amount and increase of the applied pressure are indeed as unknown as the kind of garments to be used (full leg, calf or foot garments). The full leg garments are perceived as more effective garments than the calf garments. However, clinically there is no evidence for this assumption. Additiona|ly in daily routine the use of calf garment is preferred due to simpler use and higher patient acceptance.

Material and Methods

In this study, carried out with test persons, the effect of different pneumatic calf and full leg compression systems for mechanical DVT prevention has been investigated regarding their influence on the venous return (venous peak flow). The five different device systems have been applied. The recorded data has been statistically evaluated.

Results

All Systems improve the venous return compared to resting. The VADOplex System with calf pads shows the most significant increase. With a 138% increase of the peak flow velocity, this result is almost twice as high as the next best system and approximately half as high as during normal walking.

Conclusion

This study shows that the short impulse – high pressure inflation characteristic (applied by the VADOplex Calf Pads) induces much a significantly higher hemofugal flow velocity compared to established calf and full leg compression systems. Thus it is a suitable method for an effective and patient friendly mechanical DVT prevention.

MECHANICAL PROPHYLAXIS OF DEEP VEIN THROMBOSIS AFTER TOTAL HIP REPLACEMENT

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Routine prophylaxis for venous thromboembolic disease after total hip replacement (THR) is recommended. Mechanical prophylaxis with footpumps seems to provide an alternative to chemical agents. This randomized controlled trial was carried out to compare the effectiveness and safety of mechanical versus chemical prophylaxis of DVT in patients after THR.

Inclusion criteria were osteoarthritis of the hip and age less than 80 years. Exclusion criteria included a history of thromboembolic disease, heart disease and bleeding diathesis.

There were 216 consecutive patients considered for inclusion in the trial which was randomised either for management with the A-V Impulse System footpump or low molecular weight heparin (LMWH).

We excluded 16 patients who did not tolerate continuous use of the foot pump or with LMWH. Patients were monitored for DVT using serial duplex ultrasonography at 3, 10 and 45 days after surgery. DVT was detected in three of 100 patients in the foot pump group and with six of 101 patients in the LMWH group (p<0.05). The mean post-operative drainage was 259ml in the foot pump group and 328ml in the LMWH group (p=0.05). Patients in the foot pump group had less swelling (6.1mm compared with 15mm p<0.05). One patient developed heparin induced thrombocytopenia. This study confirms the effectiveness and safety of mechanical prophylaxis of DVT in THR. Some patients cannot tolerate the foot pump.

COMPARISON OF THE USE OF A FOOT PUMP WITH THE USE OF LOW-MOLECULAR-WEIGHT HEPARIN FOR THE PREVENTION OF DEEP-VEIN THROMBOSIS AFTER TOTAL HIP REPLACEMENT

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J Bone Joint Surg (Br) Aug 1998; Vol 80A; No 8

A prospective, randomised trial was conducted to compare the safety and effectiveness of the A-V Impulse System foot pump with that of low-molecular-weight heparin for reducing the prevalence of deep-vein thrombosis after total hip replacement. Of 290 patients who were to have a total hip replacement, 143 were randomised to receive enoxaparin (forty milligrams daily) for seven days after the operation and 147, to use the foot pump for seven days. The primary outcome measure was the prevalence of deep-vein thrombosis, as determined by venography on the twenty-fourth (18 per cent) of the ninety-five patients who used the foot pump compared with eighteen patients (13 per cent) who received enoxaparin (95 per cent confidence interval for the difference in proportions, -3.9 to +1.3 per cent).

Deep vein thrombosis in the calf was found in seventeen patients (13 per cent) in the latter (95 per cent confidence interval for the difference, -4.2 to +5.8 per cent), and proximal thrombosis was observed in seventeen patients (13 per cent) in the former group compared with twelve patients (9 per cent) in the latter (95 per cent confidence interval for the difference, -3.5 to +1.1 per cent). None of these differences was significant. No patient in either group had major proximal deep-vein thrombosis; all proximal thrombi were isolated entities involving the femoral vein cuff and were of unknown importance. One patient who used the foot pump had a non-fatal pulmonary embolism. One patient who received enoxaparin had a symptomatic deep-vein thrombosis during hospitalisation (two patients (0.7 per cent) were readmitted to the hospital because of a symptomatic deep-vein thrombosis despite normal venographic findings at the time of discharge. There was no difference in the transfusion requirements or the intra-operative blood loss between the two groups.

There were more soft-tissue side effects in the patients who received enoxaparin than in those who used the foot pump; there was more bruising of the thigh and oozing of the wound (p<0.001) for each, post-operative drainage (578 compared with 492 p<0.01), and swelling of the thigh (twenty compared with ten millimetres; p=0.03). Of 124 patients who used the foot pump and were asked about the acceptability of the device, fourteen (11 per cent) said that it was uncomfortable, twentyone (17 per cent) reported sleep disturbance, and four (3 per cent) stated that they had stopped using the device. Conversely, ten (8 per cent) found it relaxing.

We concluded that the foot pump is a suitable alternative to low-molecular-weight heparin for prophylaxis against thromboembolism after total hip replacement and that it produces fewer soft tissue side effects. Tolerance of the device is a problem for some patients.
A prospective randomised study of 62 patients to determine the efficacy of a foot sole pump (A-V Impulse System) for the prevention of pulmonary embolism (PE) after hip surgery was performed. PE was assessed by pulmonary perfusion scintigraphy pre-operatively and one week post-operatively. PE was defined as any new scintigraphic defect which was larger than a bronchopulmonary segment.

Both groups received graduated elastic compression to the opposite limb before surgery and to the operated limb postoperatively. In addition, those in the treatment group received continuous mechanical prophylaxis with the sole pumping system (A-V Impulse System).

None of the patients had a past history of DVT or PE. Both the control and the treated group were well matched for age, gender, body mass index, operation time, side and surgical procedure. There was no significant difference in the mean values for bleeding time, prothrombin time, activated partial thromboplastin time, fibrinogen, antithrombin-III and D-dimer levels using a two-sample t-test (p>0.05). The total incidence of PE was 55% in the control group and 21% in the treatment group. The foot pump significantly reduced the incidence of PE (p=0.008) and there were no side effects from its use. Small pulmonary emboli may cause no symptoms and require no treatment. However, a reduction in small emboli leads to a reduction in large emboli. Consequently, the evaluation of PE by pulmonary scintigraphy is of some significance.

An prospective randomised controlled trial, the efficacy of the A-V Impulse System in the prevention of deep-vein thrombosis was investigated in 84 patients who had undergone total hip replacement. The incidence of venographically proven, and clinically significant postoperative deep-vein thrombosis was 40% in the control group and 5% in the treatment group (p<0.01). No adverse reactions were recorded.

The incidence of DVT was 23 (35.4%) in the heparin group with 16 major and 7 minor thromboses. The differences for all DVT and major DVT were both significant (p<0.005). The heparin group had one pulmonary embolism (PE) death and 9 cases treated with the intermittent plantar pump significantly reduced the incidence of PE (p=0.008) and there were no side effects from its use. Small pulmonary emboli may cause no symptoms and require no treatment. However, a reduction in small emboli leads to a reduction in large emboli. Consequently, the evaluation of PE by pulmonary scintigraphy is of some significance.

A VENOUS FOOT PUMP REDUCES THROMBOSIS AFTER TOTAL HIP REPLACEMENT

In a prospective, randomised controlled trial, the efficacy of the A-V Impulse System in the prevention of deep-vein thrombosis was investigated in 84 patients who had undergone total hip replacement. The incidence of venographically proven, and clinically significant postoperative deep-vein thrombosis was 40% in the control group and 5% in the treatment group (p<0.01). No adverse reactions were recorded.

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A VENOUS FOOT PUMP REDUCES THROMBOSIS AFTER TOTAL HIP REPLACEMENT

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J Bone Joint Surg (Br) Jan 1992; 74 No 1; 45-9

THE EFFECTIVENESS OF INTERMITTENT PLANTAR VENOUS COMPRESSION IN PREVENTION OF DEEP VENOUS THROMBOSIS AFTER TOTAL HIP ARTHROPLASTY

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Journal of Arthroplasty Feb 1993; Vol 8, No 1; p57-61

The authors conclude that chemical prophylaxis plus the use of the A-V Impulse System reduces the incidence of thromboembolic complications further than chemical prophylaxis alone.

The purpose of this prospective randomised study was to investigate the effectiveness of intermittent pneumatic compression of the plantar venous plexus with the A-V Impulse System. Seventy-four patients about to undergo primary unilateral total hip arthroplasty for osteoarthrosis, all receiving a standard thrombosis prophylaxis regime of thigh-length anti-embolic stockings, 5,000 IU heparin delivered subcutaneously twice daily, and 400 mg hydroxychloroquine sulphate delivered twice daily, were entered in a prospective trial. The patients were allocated at random to also receive the A-V Impulse System on the foot of the operated side. On approximately postoperative day 12 bilateral ascending venography was performed.

There were 44 patients in the non-pumped group and 30 patients in the pumped group. The incidence of deep venous thrombosis was 6.6% in the pumped group and 22.2% in the non-pumped group. The incidence of thrombosis was significantly lower in the pumped group (p<0.025).
Clinical outcomes of an alternative thromboembolic disease prophylactic protocol in total joint replacement

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Poster Presentation AAOS, Orlando, March 2000

1016 consecutive patients who underwent primary or revision total hip or knee replacements from 1995 – 1999 were treated with a prophylaxis protocol including a regimen of early ambulation, mechanical footpumps, compression stocking, and enetic coated aspirin. The purpose of the study was to examine the clinical outcomes of this regimen and compare these results to literature controls. A retrospective investigation was completed with clinical outcomes noted for fatal and non-fatal PE, DVT infection and haemorrhagic complications. The review was limited to the first six weeks post-operatively. Results disclosed 2 PEs (0.2%) (1 non-fatal, one fatal); 11 DTVs (1.1%); and 8 deep wound infections (0.8%). There were no haemorrhagic complications. These results are comparable with thromboembolic disease prophylaxis using heparin derivatives. The author suggests that these results support the use of the aforementioned protocol as an effective alternative to other protocols. Advantages of this protocol include low cost, ease of administration, no need for laboratory monitoring of coagulation parameters, low risk of bleeding complications and excellent patient compliance.

Thromboembolism following total hip arthroplasty is a common complication. We investigated the efficacy of a comprehensive approach encompassing the use of aspirin, intermittent compression devices (A-V Impulse System) and early mobilisation in a cohort of 200 patients after non-cemented total hip replacements.

Prevention of thromboembolic disease after non-cemented hip arthroplasty, a multi-modal approach

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Thromboembolism following total hip arthroplasty is a common complication. We investigated the efficacy of a comprehensive approach encompassing the use of aspirin, intermittent compression devices (A-V Impulse System) and early mobilisation in a cohort of 200 patients after non-cemented total hip replacements.

The presence of deep vein thrombosis was determined with the routine use of venous duplex scans on post-operative days 5-10 (mean 6.8). The duration of the follow up was 3 months. Four distal DTVs (2%) were detected in three patients. No patients developed symptomatic PE. It is the author’s opinion that a prevention strategy should include mechanical as well as pharmacological measures. The concomitant use of epidural anaesthesia, “foot pumps” (A-V Impulse System), aspirin and early full weight bearing ambulation may be effective in further reducing the incidence of DVT after surgery.

Efficacy, safety and patient compliance of foot-pumps without graduated compression stockings for prevention of deep vein thrombosis in total joint replacement

S. W. Young, R. Pitto

Recently, the International Consensus Statement (Grade A) recommendation for prevention of deep-vein thrombosis after total joint replacement. Mechanical prophylaxis with foot-pumps provides an interesting alternative to chemical agents in the prevention of thromboembolic disease following major orthopaedic surgery procedures. Recent duplex ultrasound studies have suggested that simultaneous use of graduated compression stockings (GCS) may hinder the pneumatic compression effect of foot pumps. The hypothesis of this prospective study was that

20 healthy volunteers were studied with duplex ultrasound. The peak velocity in the popliteal vein was measured at rest with the legs flat, foot up, and foot down, then it was measured when the A-V Impulse System was activated.

These measurements each were performed with and without graduated compression stockings. In each leg position, the use of aV Impulse System had the device placed. The peak velocity of the popliteal vein was reduced significantly when removed. This evaluation suggests that on physiologic grounds, graduated compression stockings should not be used simultaneously with the A-V Impulse System.

Efficacy, safety and patient compliance of foot-pumps without graduated compression stockings for prevention of deep vein thrombosis in total joint replacement

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The Journal of Arthroplasty, 2002. Vol. 17 No. 4 pp 446-448

Forty-six patients admitted at a single institution undergoing total hip (THR) or knee replacement (TKR) were included in the study. The foot-pump units where used in all patients. Forty-six patients treated with compression stockings. The foot-pump discontinuation rate of patients treated with stockings was 7%, versus 4% of patients treated without stockings (p<0.05).

In conclusion, management of patients with foot pumps without GCS does not reduce efficacy of DVT prophylaxis after THR and TKR, and improves patient compliance.

A randomised prospective comparison of foot pumps versus calf cuffs for deep vein thrombosis prophylaxis in trauma patients

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The Journal of Arthroplasty, 2002. Vol. 17 No. 4 pp 446-448

Effective deep vein thrombosis prophylaxis in trauma patients remains a challenge. Techniques usually employed include lowdose heparin and intermittent pneumatic compression (IPC). However, many trauma patients are not candidates for heparin, and calf pump (CP) devices may be not feasible in up to 35% of injured limbs. This study was performed to compare the efficacy of foot pumps (FP) to that of a CP for prevention of proximal DVT in trauma patients. 251 patients underwent prospective surveillance for proximal DVT using venous duplex ultrasound scanning (VDUS).

Based upon the nature of their trauma, patients were divided into two groups. Group 1 (n=83) could receive no heparin and were then randomised to DVT prophylaxis with either the FP (45), or CP (38) alone. Group 2 (n=168) received adjuvant low-dose heparin and were randomised to FP (87) or CP (81). Results showed that the incidence of DVT (FP) that is not significantly different for the FP or CP in either Group 1 (13.3% vs 13.2%) or Group 2 (6.6% vs 6.3%). The overall incidence of DVT appeared lower in Group 2, but this was not statistically significant. In conclusion, the A-V Impulse System produced DVT prophylaxis equivalent to that of a calf pump in all patient groups in this study. This device should provide an effective alternative to other IPC devices in trauma patients and may increase the number of cases in whom standard DVT prophylaxis can be provided.
Deep venous thrombosis (DVT) after total knee replacement (TKR) is a significant source of morbidity. Low molecular weight heparins, the most effective form of pharmacological prophylaxis, have a residual rate of venographic DVT of approximately 30%. The A-V Impulse System has been shown to reduce the risk of DVT. The aim of this study was to investigate the effect of a FIT device (A-V Impulse System) on the venous flow of the lower extremity using duplex ultrasound scanning while the patient is under general anaesthesia.

The action of foot impulse technology (FIT) in reducing the risk of deep vein thrombosis (DVT) is well established. We hypothesized that the intraoperative use of FIT devices will be effective in the prophylaxis of DVT.

The prevalence of venous thromboembolism after total knee arthroplasty represents a common postoperative complication. The prevalence of venous thromboembolism has been cited as high as 35% in patients receiving pharmacological prophylaxis alone. We investigated the efficacy of a comprehensive prevention protocol encompassing the use of epidural anaesthesia, aspirin, venous foot compression pumps (A-V Impulse System) and early mobilisation in a series of consecutive total knee arthroplasties. 100 total knee arthroplasties performed on 88 patients were enrolled in this study. All patients were allowed full weight bearing on the first postoperative day and ambulation as tolerated. The presence of deep vein thrombosis was determined with the routine use of bi-lateral venous duplex scans during the first postoperative week, and all patients were followed up for 3 months after surgery. Three patients (3%) demonstrated evidence of distal deep vein thrombosis. No patient had symptomatic pulmonary embolism. As the results of this study have shown, a multiple interventional approach seems to decrease the prevalence of thromboembolic events after TKR.

**THE A-V IMPULSE SYSTEM REDUCES DEEP VEIN THROMBOSIS AND SWELLING AFTER HEMIARTHROPLASTY FOR HIP FRACTURE**

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J Bone Joint Surg (Br); Sept 1997; Vol 79B, No 5; p775-8

Deep vein thrombosis after surgery for fractures of the hip remains a substantial problem, with no ideal method of prophylaxis. In seeking for alternative methods we assessed the effectiveness of a simple mechanical technique in a prospective, randomised, controlled study of 82 patients. All patients underwent hemi-arthroplasty for subcapital fractures of the neck of femur.

Swelling also contributes to morbidity and as a secondary objective we evaluated the relative contributions resulting from immobility and from trauma and surgery. We also investigated the effectiveness of the mechanical device in reducing this swelling. In the control group there was an incidence of 23% proximal deep vein thrombosis compared with 0% in the treatment group (p<0.01) as assessed by Doppler ultrasound. Both immobility and trauma contributed to leg swelling and the device produced a substantial reduction in this swelling. In the treatment group there was a mean reduction of swelling in the thigh of 3.27 cm (p<0.001) and 1.55 cm in the calf (p<0.001) at seven to ten days post-operatively.

**PNEUMATIC PLANTAR COMPRESSION VERSUS LOW MOLECULAR WEIGHT HEPARIN FOR THE PREVENTION OF DEEP VEIN THROMBOSIS AFTER TOTAL KNEE REPLACEMENT**

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Orthopaedic Proceedings, Journal of Bone & Joint Surgery (Br); Suppl II; 1999; p210 (O.355)

Deep venous thrombosis (DVT) after total knee replacement is known to be a significant source of morbidity. Low molecular weight heparins, the most effective form of pharmacological prophylaxis, have a residual rate of venographic DVT of approximately 30%. The A-V Impulse System has been shown to reduce the rate of venographic DVT after total knee replacement (TKR).

Purpose of the Study: To compare the safety and efficacy of Enoxaparin (Rhone-Poulenc Rorer, West Malling, UK) and the A-V Impulse System (Rhone-Poulenc Rorer, West Malling, UK) and the A-V Impulse System (Novamedix Limited, Andover, UK) in the prevention of deep vein thrombosis after total knee replacement.

Patients and Methods: 240 patients undergoing primary, unilateral total knee replacement were included in this randomised clinical trial.

Patients were randomised to one of the two treatment arms, either enoxaparin 40mg daily given subcutaneously or the A-V Impulse System. Enoxaparin was started the evening before surgery, in line with the manufacturer’s datasheet, and continued until day 7. The A-V Impulse System was initiated in the recovery room and worn at all times when not mobilising until day 7. Patients were venographically assessed by consensus between two radiologists who were who were blind to treatment. Venograms were performed between days 6 and 10 post-operation. Patients were also assessed for blood loss, transfusion requirements, bruising, haematoma, leg swelling and range of motion. Delayed thrombosis was identified at interview 3 months following surgery.

Results: There were no significant differences between groups with respect to baseline patient characteristics or operation parameters as the tumour size. Analysis of the 128 patients recruited to date is reported below. In the enoxaparin group 39% had major thrombi restricted to the calf and 51% had minor calf thrombi. Notable bruising and wound discharge was more frequent in the enoxaparin group but this did not achieve statistical significance.

Conclusion: Enoxaparin and the A-V Impulse foot pump provide similar effectiveness against DVT after total knee replacement. Whilst the proportion of patients with positive venography was high the extent of thrombosis was generally minor.

**COMPREHENSIVE DEEP VENOUS THROMBOSIS PREVENTION STRATEGY AFTER TOTAL KNEE ARTHROPLASTY**

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Venous thromboembolism after total knee arthroplasty represents a common postoperative complication. The prevalence of venous thromboembolism has been cited as high as 35% in patients receiving pharmacologic prophylaxis alone. We investigated the efficacy of a comprehensive prevention protocol encompassing the use of epidural anaesthesia, aspirin, venous foot compression pumps (A-V Impulse System) and early mobilisation in a series of consecutive total knee arthroplasties. 100 total knee arthroplasties performed on 88 patients were enrolled in this study. All patients were allowed full weight bearing on the first postoperative day and ambulation as tolerated. The presence of deep vein thrombosis was determined with the routine use of bi-lateral venous duplex scans during the first postoperative week, and all patients were followed up for 3 months after surgery. Three patients (3%) demonstrated evidence of distal deep vein thrombosis. No patient had symptomatic pulmonary embolism. As the results of this study have shown, a multiple interventional approach seems to decrease the prevalence of thromboembolic events after TKR.

**INCREMENTING CIRCULATION IN THE LOWER LIMB UNDER GENERAL ANAESTHESIA USING THE A-V IMPULSE SYSTEM**

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Angiology, 2003, Volume 54, No. 6 pp691-694

The action of foot impulse technology (FIT) in reducing the risk of deep vein thrombosis (DVT) is well established. We hypothesized that the intraoperative use of FIT devices will be effective in the prophylaxis of DVT.

The aim of this study was to investigate the effect of a FIT device (A-V Impulse System) on the venous flow of the lower extremity using duplex ultrasound scanning while the patient is under general anaesthesia.

The peak velocities with the pump active were 38.6+/-.5.0cm/sec before anaesthetic, 32.1+/-.4.2 cm/sec under anaesthetic, and 30.4+/-.5.0cm/sec post-operatively. Our study demonstrated that the use of the A-V Impulse System causes a statistical significant increase in venous velocity of the lower extremity while the patient is under general anaesthesia.

Thirteen surgical patients were selected for the study. Duplex scanning was used to measure blood velocity in the right common femoral vein, with and without the A-V Impulse System, before and during general anaesthesia. The mean resting velocity was 33.2 +/- 5.5 cm/sec in the pre-anaesthetic state, 32.1 +/- 4.2 cm/sec under anaesthetic, and 30.4 +/- 5.0cm/sec post-operatively.

The prevalence of venous thromboembolism after total knee arthroplasty is a significant source of morbidity. Low molecular weight heparins, the most effective form of pharmacological prophylaxis, have a residual rate of venographic DVT of approximately 30%. The A-V Impulse System has been shown to reduce the rate of venographic DVT after total knee replacement (TKR). The safety and efficacy of Enoxaparin (Rhone-Poulenc Rorer, West Malling, UK) and the A-V Impulse System (Novamedix Limited, Andover, UK) in the prevention of deep vein thrombosis after total knee replacement is known to be a significant source of morbidity. Low molecular weight heparins, the most effective form of pharmacological prophylaxis, have a residual rate of venographic DVT of approximately 30%. The A-V Impulse System has been shown to reduce the rate of venographic DVT after total knee replacement (TKR). The aim of this study was to investigate the effect of a FIT device (A-V Impulse System) on the venous flow of the lower extremity using duplex ultrasound scanning while the patient is under general anaesthesia. The peak velocities with the pump active were 38.6+/-.5.0cm/sec before anaesthetic, 32.1+/-.4.2 cm/sec under anaesthetic, and 30.4+/-.5.0cm/sec post-operatively. Our study demonstrated that the use of the A-V Impulse System causes a statistical significant increase in venous velocity of the lower extremity while the patient is under general anaesthesia.
A prospective study was designed to evaluate the effect of a pneumatic intermittent impulse device in the treatment of post-surgical and post-traumatic swelling of the adult foot and ankle. Two groups of patients and their respective controls were studied.

Group A consisted of 19 patients and 19 controls with acute swelling of the foot and ankle after major elective or post-traumatic surgery. Group B comprised 18 patients and 16 controls with chronic postsurgical or post-traumatic swelling. The pneumatic intermittent impulse device was used according to a predetermined daily regimen in both the control and experimental groups. The controls were treated identically, except that their impulse device was modified to prevent effective compression. Reduction in swelling was measured by volumetric analysis with water displacement at selected intervals for each group. When compared with their respective controls, those patients who used an active impulse device had a statistically significant reduction in swelling.

We conclude that this device is effective in the control of both acute and chronic swelling after trauma and surgery of the foot and ankle.

Following the discovery of a powerful venous pump in the foot that is activated by weight-bearing independently of muscular action, a pneumatic impulse device was developed to actuate this pump artificially. In a multi-centre international trial the device was evaluated.

The study was designed to evaluate the efficacy of the A-V Impulse System, a device which empties the planter venous pump by mimicking the natural action of weightbearing, in reducing pain, associated morbidity and return of function.

The results show a significant improvement in sub-talar range of movement in the foot pump group at three months (41% reduction).
Fractures of the calcaneus are always accompanied by a substantial amount of swelling and can be associated with increased compartment pressures. Because surgery is not recommended in the presence of swelling, operative management of these injuries can be delayed for 5 to 7 days while the patient is hospitalised for the control of edema. Therefore, a method to reduce swelling, surgical delay and potential for compartment syndrome would be of great benefit to patients with calcaneal fractures. To determine the effects of the A-V Impulse System on foot swelling, intracompartmental pressures, and hospital stay associated with acute calcaneal fractures, we retrospectively reviewed the records of 55 patients whose management profile included preoperative use of the A-V Impulse System and surgical treatment by open reduction and internal fixation. Average times were: injury to admission, 6.04 days; admission to surgery, 1.35 days; and surgery to discharge, 3.38 days. Hospital stay averaged 4.73 days. In 27 patients with suspected compartmental ischaemia, admission and preoperative pressures in three compartments were averaged and compared. The mean compartment pressures averaged 18.22+/−2.59 mmHg on admission. In the immediate postoperative period the mean compartment pressure averaged 3.81+/−0.44 mmHg, a significant difference (p<0.001) from the admission pressures. The authors concluded that the intermittent compression (A-V Impulse System) appears to rapidly reduce swelling of the foot and decrease elevated compartment pressures associated with calcaneal fractures, which may play a role in reducing hospital stay.

Fractures and dislocations in the distal tibia and foot may cause significant swelling. As a consequence, operative treatment of these injuries has been delayed. The A-V Impulse System was used in 60 patients with injuries in the tibia, ankle and foot. In these patients, reduction of swelling within 24-48 hours was observed. This significantly reduced the waiting period until surgery. The reduction in swelling was 78.6% in swelling of the injured hand (p<0.001). A subjective reduction in pain was also reported. A statistically significant effect was seen. Acute swelling of the hand is a common problem after trauma and surgery and is associated with loss of function and pain. This prospective study of 47 patients found that the A-V Impulse System when used on the swollen hand had reduced swelling by increasing the velocity of venous return as demonstrated by Duplex scanning of the median cubital vein. Continuous use of the pump for 48 hours gave a reduction of 78.6% in swelling of the injured hand. Even when used intermittently, for 12 hours daily, a statistically significant effect was seen. A subjective reduction in pain and objective improvement in function of the hand was also reported.