PUBLICATIONS - ABSTRACTS

1. Nondrainage Decreases Blood Transfusion Need and Infection Rate in Bilateral Total Knee Arthroplasty

The Journal of Arthroplasty (2013) Demirkale et al.

Abstract

This retrospective study enrolled 526 patients undergoing bilateral total knee arthroplasties at our institution. In nondrainage group (Group 1) of 255 patients (510 knees), a disposable elastic sterile exsanguination tourniquet (HemaClear), wound closure in layers and Jones Bandage, without pre-tourniquet removal hemostasis or Hemovac drain were used. In drainage group (Group 2) of 227 patients (454 knees), pneumatic tourniquet, post-deflation hemostasis, a Hemovac drain and Jones bandage were used. The maximal drop in hemoglobin was significantly greater in Group 2 than Group 1 (P b 0.001). Also infection rate was significantly lower in Group 1 (P = 0.017). The use of sterile tourniquet removed after wound closure without Hemovac drain decreases blood transfusion need, infection rate, tourniquet related pain and postoperative complications. *(Knee arthroplasties)*

2. The Silicone Ring Tourniquet in Orthopaedic Operations of the Extremities

Surg Technol Int. 2013 Sep; 23:251-7. Drosos et al.

Abstract

Tourniquets provide a bloodless field in limb operations and their introduction in orthopaedic operative technique has been considered as a landmark. A new tourniquet device, a silicone ring tourniquet (SRT) (HemaClear or S-MART, OHK Medical Devices, Haifa, Israel), was introduced into clinical practice a few years ago. A few clinical studies as well as comparative studies in volunteers have reported its use in a relatively small number of cases. The aim of this prospective study is to report the clinical use of this device in a large number of patients, including all possible applications of a tourniquet. The SRT was used in 536 cases including 337 male and 119 female patients with a mean age of 43.7 years (range 6 to 87 years). The average tourniquet time was 58.5 minutes (range 6 to 180 minutes). It was applied in 362 (67.5%) elective and in 174 (32.5%) trauma cases including fractures (n:109, 62.6%) and soft-tissue injuries (n:65, 37.4%). The most frequent application site was the femur (n:255, 47.6%), followed by the forearm (n:154, 28.7%), humerus (n:65, 12.1%), and calf (n:62, 11.6%). Because the device is sterile it was possible to use it in operations in which the pneumatic tourniquet cannot be used, such as open reduction and internal fixation of humeral shaft and femoral supracondylar fractures. In 14 patients (2.6%), the tourniquet failed intraoperatively, and the cause was an unexpected raised blood pressure. The SRT - with a pre-set pressure according to the size and the tension model - is easy to apply. It is sterile, and occupies a narrow area of the limb. Its application combines three functions at the same time: exsanguination, tourniquet, and stockinet application. Although it cannot entirely replace the classic pneumatic tourniquet, it is a safe and useful device in orthopaedic operations because of its advantages. *(Mostly Hip, Pediatrics, Adults; 5 advantages; 2 disadvantages)*

3. Silicone Ring Versus Pneumatic Cuff Tourniquet: A Comparative Quantitative Study in Healthy Individuals

Arch Orthop Trauma Surg, G. I. Drosos

Abstract

The aim of the present study was to compare a new silicone ring tourniquet (SRT) with a classic pneumatic caff tourniquet (PT) in terms of tolerance and recovery time following their use in healthy volunteers.

METHODS: Both tourniquets were applied in the arm and thigh of 15 healthy unmediated volunteers. PT pressure was kept at 100 mmHg above the systolic blood pressure. The appropriate model of the SRT was used according to the systolic blood pressure. Pain was assessed by visual analogue scale and arterial blood pressure, pulse rate and oxygen saturation were monitored in all volunteers.

RESULTS: There was no statistically significant difference in tolerance time between SRT and PT in the arm (19.13 vs. 18.25 min) and thigh (21.52 vs. 21.39 min) nor in recovery time between the two devices.

CONCLUSION: The SRT performed similarly to the classic PT in terms of tolerance and recovery time when applied in in the arm and thigh of unmediated healthy volunteers. *(Hand: Carpal tunnel)*

4. **A Sterile Elastic Exsanguination Tourniquet is Effective in Preventing Blood Loss During Hemodialysis Access Surgery**

J Vasc Access 2013;14 (2): 116-119 Eric Ladenheim et al.

Abstract

We report the first use of a sterile elastic exsanguination tourniquet (SET) in performing hemodialysis vascular access procedures in 27 patients. The main advantages of this tourniquet are the reduction of blood loss and need for possible transfusions. Additional benefits are the near-perfect exsanguination and excellent exposure of the operative field.
METHODS: This SET is a sterile elastic stockinet device that rolls up the arm starting from the hand by pulling on two handles. The elastic silicone ring provides sufficient pressure (220 ± 30 mmHg) to block arterial flow into the limb. The stockinet can be cut to provide access to the incision area while providing an additional sterile cover over the rest of the limb.
RESULTS: No transfusions were required in any patients. Minor adverse effects occurred in four patients, including a twisted vessel, a bleeding vascular branch, a tear in atrophic arm skin, and pain, all of which had resolved on subsequent follow-up. Operational recommendations to avoid these adverse effects are outlined.
CONCLUSIONS: We conclude that this sterile elastic exsanguination tourniquet is effective and safe in preventing bleeding during *(ForeArm Upper arm: dialysis access procedures)*

5. **The Effect of Sterile Versus Non-Sterile Tourniquets on Microbiological Colonisation in Lower Limb Surgery**

Annals of The Royal College of Surgeons of England, Volume 93, Number 8, November 2011, pp. 589-590(2). Thompson, SM

Abstract

INTRODUCTION: Surgical tourniquets are commonplace in lower limb surgery. Several studies have shown that tourniquets can be a potential source of microbial contamination but have not compared the use of sterile versus non-sterile tourniquets in the same procedures.
METHODS: Patients undergoing elective orthopaedic lower limb surgery were randomised prospectively to use of non-sterile pneumatic tourniquet or sterile elastic exsanguination tourniquet (S-MART™, OHK Medical Devices, Haifa, Israel). Samples were taken from the ties of the non-sterile tourniquet prior to surgery and from the sterile tourniquets at the end of the operation in a sterile fashion. These were then sealed in universal containers and immediately analyzed by the microbiology department on agar plates, cultured and incubated.
RESULTS: Thirty-four non-sterile tourniquets were sampled prior to surgical application, twenty-three of which were contaminated with several different organisms including coagulase-negative Staphylococcus spp, Staphylococcus aureus, Sphingomonas paucimobilis, Bacillus spp, and coliforms. Thirty-six sterile tourniquets were used, with no associated contamination.
CONCLUSIONS: There was significant contamination of 68% of orthopaedic surgical tourniquets. These are used regularly in procedures involving the placement of prosthesis and metalwork, and can act as a potential source of infection. We recommend the use of sterile single-use disposable tourniquets where possible. The availability of an alternative should now set the new standard of care and we recommend adopting this as a current NICE guideline for control of surgical site infection. *(Lower limb surgery, SSI)*

6. **Pain and Paresthesia Produced by Silicone Ring and Pneumatic Tourniquet**

The Journal of Hand Surgery, Vol 36E(3), p. 215-218, 2010. A Mohan.

Abstract

Twenty volunteers were recruited to compare a novel, silicone ring tourniquet (the Hemaclear! tourniquet) with a pneumatic tourniquet. After application of the tourniquets, the pain and paraesthesia experienced by the participants was scored at 1 minute, 5 minutes, and 10 minutes. This was repeated with the tourniquets on the forearm. On the upper arm, the silicone ring tourniquet was associated with a significantly lower pain score than the pneumatic tourniquet. The incidence of paraesthesia was also lower with the silicone ring tourniquet. When applied to the forearm, there was no statistically significant difference in pain scores between the two types of tourniquets. However the incidence of paraesthesia was again lower with the silicone ring tourniquet. *(Upper arm, Forearm)*

7. **Silicone Ring Versus Pneumatic Cuff Tourniquet: A Comparative Quantitative Study in Healthy Individuals**

Arch Orthop Trauma Surg. Georgios I. Drosos

Abstract

INTRODUCTION: The aim of the present study was to compare a new silicone ring tourniquet (SRT) with a classic pneumatic cuff tourniquet (PT) in terms of tolerance and recovery time following their use in healthy volunteers.
METHODS: Both tourniquets were applied in the arm and thigh of 15 healthy unmediated volunteers. PT pressure was kept at 100 mmHg above the systolic blood pressure. The appropriate model of the SRT was used according to the systolic blood pressure. Pain was assessed by visual analogue scale and arterial blood pressure, pulse rate and oxygen saturation were monitored in all volunteers.
RESULTS: There was no statistically significant difference in tolerance time between SRT and PT in the arm (19.13 vs. 18.25 min) and thigh (21.52 vs. 21.39 min) nor in recovery time between the two devices.
CONCLUSIONS: The SRT performed similarly to the classic PT in terms of tolerance and recovery time when applied in the arm and thigh of un-medicated healthy volunteers. *(Arm and Thigh)*

8. **Surgical Tourniquets in Orthopaedics**

J Bone Joint Surg Am. 2010;92:1318-1322. (To The Editor). Noam Gavriely

Abstract

SUMMARY: The data described above clearly document the superior safety track record of the elastic exsanguination tourniquet (S-MART/HemaClear) over the wide tourniquet promoted by Dr. McEwen and materially refute his unsubstantiated allegations. The smaller pressure inside the limb at the nerve level and the less steep internal axial pressure gradients are the underlying mechanisms of this improved patient outcome. The fact that the patient's skin tolerates the SMART/HemaClear better than the wide tourniquet cuff has to do with specific design details. These features are accompanied by other advantages: the overall lower volume of tissue that is under compression conditions, the time needed for preparation and application, the fact that the S-MART/HemaClear exsanguination is superior, with an excellent surgical field and larger room for wider exposure because of the smaller footprint of the occluding ring, its usefulness both on the upper part of the limbs (arm and thigh) as well as on the tapered parts of the limb (calf and forearm), and its sterility all contribute to the popularity that this product is gaining.

9. **The Use of Sterile Tourniquet in Paediatric Orthopaedics**

E.E.X.O.T., Volume 61, Number 3, 2010:153-158. MARKEAS N, et al.

Abstract

BACKGROUND: This prospective study was designed to highlight the pros and cons of the application of sterile tourniquet in children with congenital deformities, benign tumors or fractures of upper and lower limbs.
MATERIAL AND METHODS: From October 2007 to April 2008 this device was used in 40 children (23 boys and 17 girls), with an average of 5.6 years old (range from 6 months to 14 years), who were treated surgically in our Department. Twenty three operations affected the upper, and 23 the lower limbs. The effectiveness of this type of tourniquet was evaluated according to specific criteria and was compared to that of pneumatic tourniquet, not only during the operation, but also post-operatively.
RESULTS: There was no failure of application or cutaneous complications after its removal and no complaints from the young patients at all as well.
CONCLUSIONS: Sterile tourniquet seems to advantage due to its ease of application, shortening of operative exsanguination time, success in retaining a sterile field and easy replacement in operations lasting over ninety minutes. Moreover, no skin plicas or necrosis can be found after its removal and the surgeon needs no help by the nurse to put it in place. Issues of concern are its operatively stable pressure (inability to up-or-down regulate), the contraindications of use in operations lasting more than ninety minutes and its insufficiency in unstable fractures or dislocations. *(Pediatrics)*

10. **Use of a New Exsanguination Tourniquet in Internal Fixation of Distal Radius Fractures**

Techniques in Hand & Upper Extremity Surgery - Volume 13, Number 4, December 2009. Doron Norman

Abstract

We describe our experience using a new device that results in a bloodless field in open repair of distal radius fractures.

The device, an exsanguinating tourniquet (HemaClear model/40, OHK Medical Devices, Haifa, Israel), replaces the traditional methods of limb elevation, Esmarch bandaging, pneumatic tourniquet pressurizing and the associated components. HemaClear/40 is an elastic silicon ring with a tubular elastic sleeve rolled onto it. The device has attached straps that, when pulled, unroll the sleeve, rolling the ring mesially on the limb. The pressure exerted by rolling HemaClear/40 is suprasystolic thereby exsanguinating the limb and occluding the arterial inflow. Our experience in 49 patients demonstrated quick application, superior exsanguination and that the device could be placed on the forearm instead of the upper arm. No side effects or complications were noted. In our opinion, the fact that HemaClear/40 is a sterile, single-patient device makes it superior over the traditional technology. *(Upper extremity: Hand, Wrist)*

11. Pain Tolerance with a Novel Tourniquet in Hand Surgery - A Comparative Study

Mr Arvind Mohan

Abstract

Twenty volunteers. In conclusion, SMART tourniquet is a good tourniquet for hand surgery as it has comparatively better pain tolerance and produces less parasthesias as compared to pneumatic tourniquet. the arm and thigh of unmedicated healthy volunteers *(see also ref 6).*

12. Use of the S-MART Tourniquet in Total Elbow Arthroplasty

Mr Arvind Mohan

Abstract

As S-MART is a sterile tourniquet it reduces the risk of infection. Combined exsanguination provides a better haemostasis as compared to the pneumatic tourniquet. This is the first study in literature looking at the use of this novel tourniquet in total elbow arthroplasty. *(see ref 6) (Elbow, Infections)*

13. Safety of Using a Novel Device for Creating a Bloodless Surgical Field in Pediatric Limb Fractures

N. Hous, D. Norman, A. Katzman and M. Eidelman.

Abstract

No SET placement-related or pneumatic tourniquet complications were observed. The axial traction by two surgeons' technique was applied with no difficulty. The surgical procedures were under excellent visibility conditions with the SET. The SET was found to be safe for use in trauma while performing the axial stretching technique under imaging control. *(MK01600), (Trauma)*

***14.* S-MART and Pneumatic Tourniquet in Foot Surgery - A Randomized Controlled Study**

Arvind Mohan

Abstract

SMART™ tourniquet provides a good intraoperative haemostasis and is easy to apply. The limitation is it cannot be reinflated and cannot be used in patients with fractures. S-MART tourniquet is a good for foot surgery, provides a good operative field, is easy to apply and saves precious theatre-time and resources. *(Foot), (MK01601)*

15. A Randomised Controlled Study Looking at the Use of S-MART™ and Pneumatic Tourniquet in Foot Surgery

A Mohan, P Ramesh and M Curtis

Abstract

CONCLUSION: S-MART tourniquet is a good for foot surgery, provides a good operative field, is easy to apply and saves precious theatre time and resources. *(Foot)*

16. A Novel Elastic Exsanguination Tourniquet as an Alternative to the Pneumatic Cuff in Pediatric Orthopedic Limb Surgery

Journal of Pediatric Orthopaedics B 2006, 15:379–384. Mark Eidelman, Alexander Katzman and Viktor Bialik

Abstract

We describe our experience with a novel surgical exsanguination tourniquet (S-MART; OHK Medical Devices, Haifa, Israel) in clinical pediatric orthopedics. We evaluated the surgical exsanguination tourniquet's properties and clinical

use in 51 patients and compared our observations with our long-standing experience with the Esmarch bandage, pneumatic tourniquet and sterile stockinet. Using the surgical exsanguination tourniquet, we found superior exsanguination quality, quick application and the ability to place the occlusion ring closer to the surgical field. No side effects or ischemic complications were observed. After removal, the skin under the ring was intact in all cases. We conclude that the surgical exsanguination tourniquet is safe and valuable in our practice. *(Pediatric)*

17. **Silicone Ring Versus Pneumatic Cuff Tourniquet: A Preliminary Comparative Quantitative Study in Healthy Individuals**

7th EFORT Congress, Lisbon, Portugal, June 2005, G. I. Drosos et al. Abstract ID: 2476

Abstract

CONCLUSIONS: This preliminary study shows that the use of the new silicone ring tourniquet may present with some advantages over the use of a standard pneumatic cuff tourniquet although due to the small number of tested individuals the differences in outcome parameters were not statistically significant. Further investigation into this subject is necessary before final conclusions can be drawn. *(Arm and thigh of healthy volunteers)*

18. **The Use of the S-MART Tourniquet in Hand Surgery: A Safe and Effective Way to Provide a Bloodless Field**

Surgery Research and Practice Volume 2014, Article ID 402184, 3 pages O. Templeton-Ward, J. Feher, and P. Davey

Abstract

We have retrospectively reviewed our use of the S-MART sterile silicon ring self-exsanguinating tourniquet in 300 consecutive minor hand surgical procedures. A total of 3 postoperative complications were identified, only 1 of which was directly related to the tourniquet's use. We outline the reasons of why we feel that this device provides a safe and effective bloodless field and the benefits of its use. *(Hand)*

19. **Evaluation of a Novel Tourniquet Device for Bloodless Surgery of the Hand**

Journal of Hand Surgery (British and European Volume, 2004) 29B: 2: 185–187M. Boiko and M. Roffman (Hand)

Abstract

This study evaluates a new device (S-MART™) for exsanguination and occlusion of the blood flow to the arm for hand surgery. The device consists of a silicone ring wrapped within a sterile stockinette and pull straps. It is applied by placing it on the patient's fingers and rolling it up the limb to the desired occlusion site by pulling on the straps. The time for placement and removal of the device was measured during trigger release and carpal tunnel surgery and the quality of exsanguination was evaluated. The device could be placed and removed quickly and provided an excellent bloodless field. At follow-up examination no signs or symptoms were seen at the site of the S-MART occlusion and no complications were observed in any patient. *(Hand: carpal tunnel release, trigger finger)*