

References on Tourniquet Pain

- Journal of Arthroplasty, 2013. Nondrainage Decreases Blood Transfusion Need and Infection Rate in Bilateral Total Knee Arthroplasty. Demirkale, et al. "Significantly fewer patients reported pain in the thigh at the site of the placement of a sterile elastic tourniquet."
- Clinical Services Journal, Sept 2006. Exsanguinating tourniquet assessed. "So while the patient feels no pain at the surgical site; he or she routinely requires further anaesthesia due to the discomfort experience from the pressure tourniquet." "[HemaClear] Better tolerated... and that routine anesthetic, due to pressure cuff discomfort during ankle surgery was avoided."
- J Orthopaed Traumatol. 30Jan2013. Silicone ring tourniquet versus pneumatic cuff tourniquet in carpal tunnel release: a randomized comparative study. "Overall PT [pneumo tourniquet] application produced a highly significant elevation of the pain score by 88.5% (P<0.001) compared to the initial pain score. SRT [HemaClear] was 26.5%." "On the other hand, a study of human volunteers showed that narrow cuffs resulted in less pain and were tolerated for a longer time than wider cuffs, and, more recently, nerve conduction studies showed that wider cuffs result in more severe nerve changes than narrow cuffs inflated to the same pressured and used for the same period of time." [make a pain graph from this one]
- JHS(E), 2010 Pain and paraesthesia produced by silicone ring and pneumatic tourniquets. "Overall, it was found that in the upper arm, after 10 minutes, the silicone ring tourniquet was associated with a significantly lower pain score than the pneumatic tourniquet." [after 10 minutes of application, HC 75% less pain score than pneumatic]
- Arch Orthop Trauma Surg, 29June2010. Silicone ring versus pneumatic cuff tourniquet: a comparative quantitative study in healthy individuals.. "On the other hand, human volunteer studies have shown that wider tourniquets resulted in more pain and were tolerated for less time than narrow cuffs. A more recent study found that this is true in higher pressures, but in lower pressures a wide tourniquet cuff is less painful than a narrow cuff. Nerve conduction studies in volunteers have shown recently that wider cuffs resulted in more severe changes in the nefve than narrow cuffs inflated at the same pressure and time." [other pain references: Hagenouw R, et al, 1986. Tourniquet pain: a volunteer study. Anesth ANalg 65:1175-1180. More on page 91 spiral book]
- World Journal of Orthopedics, Vol 6, Issue 4, 18May2015 Nerve compression and pain in human volunteers with narrow vs wide tourniquets. "An experimental study in 20 healthy volunteers concluded that wider cuffs result in more severe changes in the nerve."

- [Journal of Long-Term Effects of Medical Implants](#), 26(2): 173-181, 2016. Upper Extremity Nerve Function and Pain in Human Volunteers with Narrow versus Wide Tourniquets. Kovar et al. "In the narrow HC tourniquet, the isobars from either side overlap, causing less pressure in the central, deep section where compression of the artery and nerve takes place. Skin pressure may be high, but the delicate neurovascular structures are subjected to lesser pressure, and over a shorter distance, with theoretically less damage potential." "Pain was significantly higher in the HC device at 2, 5, 8 and 14 minute time intervals. Pain was reduced to 0 in both devices 10 minutes after tourniquet was removed" [great diagram of comparison and pressure issue] [nothing great on pain but useful to show that wide cuff people are not truthful about pressure decreasing across the tourniquet.]

Other references

- [J Anaesthesiol Clin Pharmacol](#). 2016 Oct-Dec; 32(4): 424–430. Tourniquet application during anesthesia: "What we need to know?" [Kamal Kumar](#), et al. "Noninflatable (nonpneumatic) tourniquets are made of rubber or elastic cloth. Now-a-days, their surgical use alone is limited because they have been replaced by modern tourniquet systems." [these guys need a note - they don't know HC.]
- [Indian J Orthop](#). 2012 Jul-Aug; 46(4): 377–383. Tourniquets in orthopedic surgery. [Jai Prakash Sharma](#) and [Rashmi Salhotra](#). "The newer tourniquet deflation devices like S-MART have recently come in the market and larger trials and studies need to be done to prove their efficacy."
- [Knee Surg Relat Res](#). 2014 Dec; 26(4): 207–213. Effects of Tourniquet Use on Quadriceps Function and Pain in Total Knee Arthroplasty, [David Liu](#), FRACS, et al "The no tourniquet group had significantly less pain in the early post-operative period compared to the tourniquet group. There was no difference in Oxford knee score, range of motion, or thigh and knee swelling up to 12 months post-operatively. Quadriceps function, measured by surface EMG, was compromised for the first six months post-surgery by tourniquet use. The radiological cement mantle at the bone prosthesis interface at 12-month follow-up was not affected by the absence of a tourniquet. We believe that it is safe and beneficial for our patients to routinely perform TKA without a tourniquet."
- [J Arthroplasty](#). 1997 Dec; 12(8):848-52. Thigh pain following tourniquet application in simultaneous bilateral total knee replacement arthroplasty. [Worland RL 1](#), [Arredondo J](#), [HC user] [Angles F](#), [Lopez-Jimenez F](#), [Jessup DE](#). "At 6 weeks after surgery, the difference in thigh pain was gone. For total knee arthroplasty, using the tourniquet at a pressure of 100 mmHg above the systolic blood pressure is recommended. This is adequate to provide a bloodless field and will result in a less unpleasant postoperative period."