

Comparison of time-efficiency of individually wrapped screws and sterile screw racks in distal radius fracture treatment

Peer-reviewed author version

Philips, Tim; Molenaers, Ben; CAEKEBEKE, Pieter; Flies, Mike; Vanderhaeghen, Olivier & DUERINCKX, Joris (2024) Comparison of time-efficiency of individually wrapped screws and sterile screw racks in distal radius fracture treatment. In: ARCHIVES OF ORTHOPAEDIC AND TRAUMA SURGERY, 144 , p. 2127-2129.

DOI: 10.1007/s00402-024-05278-6

Handle: <http://hdl.handle.net/1942/42824>

Comparison of time-efficiency of individually wrapped screws and sterile screw racks in distal radius fracture treatment.

LEVEL OF EVIDENCE: level I (therapeutic, randomized controlled trial)

TEXT

Introduction

Screws used for surgical fracture treatment have historically been retrieved from screw caddies (SC) that are sterilized after each surgery. In 1997, Australian Standard AS/NZS 4187 [1] started a trend towards the implementation of individually wrapped screws (IWS). This was mainly based on concerns that screws in caddies cannot be properly sterilized, implant failure may occur by the process [2] and lack of traceability. In a recent systematic review there was no distinct benefit regarding safety and effectiveness of one method over another in orthopedic trauma surgery [3]. Moreover, skepticism rose due to a number of possible disadvantages of IWS: increased cost, increased risk of contamination by opening of individually packaged items [4,5] and prolonged operative time [6]. The latter can compromise complex fracture treatment when tourniquet time may impose a constraint. The exact difference in operative time between both methods is not known and it was the goal of this study to determine this.

Materials and Methods

We performed a prospective clinical study comparing time-efficiency of SC and IWS in distal radius fracture treatment. Eight patients scheduled for volar distal radius plate fixation (VA LCP Two-Column plate system, DepuySynthes, Raynham, MA) were included in this study after approval of the ethical committee of our institution (Z-2023005) and informed consent. Patients were randomized to be treated with one of both screw types. In total, 31 SC and 33 IWS were used. The camera and data collection system of DEO.care (Beringen, Belgium) was used to measuring the time interval between the surgeon asking and receiving a specific screw (Figure 1). All surgeries were performed in a level I trauma center by wrist and trauma surgeons with a level of expertise of 3 or higher for this surgery according to Tang & Giddins [7] and scrub nurses with at least 3 years of experience with this surgery.

Results

We used an average of 8 screws per patient (range 6-9) in the SC group and 8 screws per patient (range 6-10) in the IWS group. The average handling time of SC screws was 9 seconds (SD 5,5; range 3-28) and 22 seconds for IWS screws (SD 6,1; range 6-38). This average difference of 13 seconds is significant ($p < 0,0001$) according to the unpaired T-test.

Discussion

44 The present study demonstrates that in the real-life clinical setting of distal radius
45 fracture treatment, the use of IWS will prolong surgery on average by 1 min 44 s.

46 Khan et al. [6] used an experimental set-up and a stopwatch to compare the time-
47 effectiveness of SC and IWS when orthopaedic surgical trainees inserted six cortical
48 screws in a 3,5 mm DCP plate. The use of IWS significantly increased screw handling
49 time by 3 min 58 s.

50 We can conclude that the use of IWS significantly adds operative time. If this results in
51 clinical drawbacks is not clear yet. New practices like IWS need proper clinical
52 evaluation before widespread and obliged implementation. Therefore, further research
53 should evaluate if IWS are really beneficial.

References

1. Australia Standards AS/NZS 2817:1997 (1997) Implants for Surgery Care and Handling of Orthopaedic Implants. <https://www.standards.org.au/standards-catalogue/standard-details?designation=as-nzs-2817-1997>. Accessed 19 November 2023.
2. Burns H (2006) Migration to single-use pre-sterilised individually wrapped small orthopaedic implants in NHS Scotland. [http://www.scot.nhs.uk//sehd/cmo/CMO\(2006\)13.pdf](http://www.scot.nhs.uk//sehd/cmo/CMO(2006)13.pdf). Accessed 1 November 2023.
3. Suchowersky AM, Hua M, Lorentzos P, Ashton LA (2020) A comparison of risk profile for orthopaedic operations when utilizing individually wrapped screws (IWS) when compared with sterile screw caddies (screw racks). J Orthop Surg 28: 1–6. <https://doi.org/10.1177/2309499020944086>
4. Smith G, Vindenes F, Keijzers G, Rando A (2009) Potential for infection in orthopaedic practice due to individually packaged screws. Injury 40: 1635. <https://doi.org/10.1016/j.injury.2008.06.024>
5. Cirk B, Chua S, Canty J, McCullough K (2008) Potential for contamination of orthopaedic implants using individually wrapped screws. ANZ J Surg 78: 2668. <https://doi.org/10.1111/j.1445-2197.2008.04433.x>

- 74 6. Khan Y, Tokarczyk S, Khan I, et al. The use of individually wrapped presterilized
75 small orthopaedic implants increase operating time: a prospective
76 experimental study. JRSM Short Rep. 2013;4:34.
- 77 7. Tang JB, Giddins G. Why and how to report surgeons' levels of expertise. J
78 Hand Surg Eur Vol. 2016;41:365.

79 **Figures**

80

81 Figure 1. Blinded images captured with the DEO remote camera system and software.

82 Surgeon indicates asking a screw type and length by raising his hand (left). Scrub

83 nurse having screwdriver with correct screw ready on a screwdriver (right). These

84 visual signals allow the software to detect and timestamp specific actions during

85 a surgical procedure.