

*Article 1:*

[Am J Surg.](#) 2001 Jun;181(6):564-6.

[How often does glove perforation occur in surgery? Comparison between single gloves and a double-gloving system.](#)

[Laine T<sup>1</sup>](#), [Aarnio P.](#)

[Author information](#)

**Abstract**

**BACKGROUND:**

In surgery, intact gloves protect the surgeon from bloodborne pathogens and the surgical wound from microorganisms on the skin of the surgeon. However, **glove perforation is very common, and puncture rates as high as 61% are published in the literature.** One objective of this study was to compare puncture rates between a unique double-gloving puncture indication system and single-use gloves, and another was to determine the extent to which glove perforations remain undetected during surgery.

**METHODS:**

The study material comprised all gloves used in surgical operations at our hospital for a period of 2 months. The analysis was made by the glove type in a prospective and randomized manner. Gloves were tested immediately after the surgical procedure using the approved standardized water-leak method for 2 minutes to detect any holes. The gloves used in this study were either a double-gloving puncture indication system or the standard glove used at our hospital.

**RESULTS:**

In 885 operations altogether, 2,462 gloves were tested; 1,020 single gloves, 1,148 double-glove systems, and 294 combination gloves were studied. The overall perforation rate was 192 out of 2,462 gloves (7.80%), and 162 out of 885 operations (18.3%). The detection of perforation during surgery was 28 out of 76 (36.84%) with single gloves, 77 out of 89 with the double-gloving system (86.52%), and 9 out of 27 with combination gloves (33.33%; P <0.001). **The inner glove of the double-gloving system was punctured in 6 out of 88 outer glove perforations (6.82%).**

**CONCLUSIONS:**

In view of the critical importance of safety at work by having a sterile barrier between surgeon and patient, it is very important to use a double-gloving puncture indication system, at least in operations where there is a high risk of glove perforation.

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**HSP Footnote:**

The highest incident of perforation in surgery is 61%. The *Hensler Bone Collector* will remove the tactile component of clearing sharp instruments, specifically, the Kerrison™, Leksell™, Currettes and various other surgical instruments that require clearance of bone and/or tissue for the surgical case. Double gloving is not enough to prevent infection.

*Article 2:*

[Malays Orthop J.](#) 2016 Nov;10(3):31-35. doi: 10.5704/MOJ.1611.010.

## [A Cross-sectional Analysis of Glove Perforation in Primary and Revision Total Hip Arthroplasty.](#)

[Kumar D<sup>1</sup>](#), [Shantanu K<sup>1</sup>](#), [Kumar M<sup>1</sup>](#), [Kumar A<sup>1</sup>](#), [Sharma V<sup>1</sup>](#).

### Author information

#### **Abstract**

The number of total hip arthroplasties is ever increasing. Literature about glove perforation rates in arthroplasties in India is very scarce. The purpose of our study was to determine the incidence of glove perforation and increasing the awareness of possible glove perforations to decrease the risk of infection. We performed a prospective study in which we tested gloves worn by all scrubbed personnel. A total of 1408 gloves were collected from 42 primary total hip and 13 revision total hip arthroplasties. Incidence of glove perforation was found to be more in revision total hip arthroplasty. We found a greater outer glove perforation rate of about 38.33% as compared to 25 % inner glove perforation rate. **Outer glove perforation was recognized 100% of time intraoperatively but inner glove perforation was noted only 17% of time.** First assistant recorded highest rate of glove perforation.



Identification of perforations by pressurization of the gloves filled with water. (Used with permission)

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### ***HSP Footnote:***

Glove perforation is again re-instated. The *Hensler Bone Collector* will remove the tactile component of clearing sharp instruments, specifically, the Kerrison™, Leksell™, Curettes and various other surgical instruments that require clearance of bone and/or tissue for the

surgical case. In this case, it was a hip arthroplasty, however, many instruments in spine are used in Orthopedics, thus is very pertinent.

*Article 3:*

[J Natl Med Assoc.](#) 2003 Dec;95(12):1184-8.

## **Incidence of glove failure during orthopedic operations and the protective effect of double gloves.**

[Thanni LO<sup>1</sup>](#), [Yinusa W.](#)

[Author information](#)

**Abstract**

### **OBJECTIVE:**

To determine the usefulness of double gloves in protecting against the exposure of surgical team members' hands to blood.

### **METHODOLOGY:**

Five-hundred-ninety-six gloves were studied during 71 orthopedic operations using the water-loading test (filling a glove with water and occluding its cuff tightly to identify leaking points).

### **RESULTS:**

In all, 73 glove perforations occurred, but only nine resulted in exposure to blood (blood touching the skin). The incidence of glove perforation was 12% (73/596), and overall exposure (blood touching the skin) per operation was 13% (9/71). The latter would have been 87% (62/71) but for the use of double gloves. Sixteen percent of the perforations in double gloves were in the inner gloves, while 84% were in the outer gloves. Exposure of surgeons was reduced from 54% to 10%, first assistants from 27% to 3%, and second assistants from 7% to 0 ( $p < 0.02$ ,  $df = 2$ ) by double-gloving. Significantly more perforations occurred during operations on bone, compared with soft tissue operations,  $p < 0.0001$ ,  $RR = 4$  (95% CL 1.87-8.55). **The most common sites of glove perforation were the index finger (47%), thumb, and the palm region: 14% each. More glove perforations occurred in nondominant hands.**

### **CONCLUSION:**

Double-gloving offers additional protection to surgeons and assistants by preventing hand exposure to blood intraoperatively.

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*HSP Footnote:*

Glove perforation is again re-instated. The *Hensler Bone Collector* will remove the tactile component of clearing sharp instruments, that require clearance of bone and/or tissue for the surgical case. In this case, it was a hip arthroplasty, however, many instruments in spine are used in Orthopedics, thus is very pertinent.

Article 4:

[Postgrad Med J. 2001 Jul;77\(909\):458-60.](#)

## [Intraoperative glove perforation--single versus double gloving in protection against skin contamination.](#)

[Thomas S<sup>1</sup>](#), [Agarwal M](#), [Mehta G](#).

### **Author information**

### **Abstract**

Surgeons have the highest risk of contact with patients' blood and body fluids, and breaches in gloving material may expose operating room staff to risk of infections. This prospective randomised study was done to assess the effectiveness of the practice of double gloving compared with single gloving in decreasing finger contamination during surgery. In 66 consecutive surgical procedures studied, preoperative skin abrasions were detected on the hands of 17.4% of the surgeons. In the double gloving pattern, 32 glove perforations were observed, of which 22 were in the outer glove and 10 in the inner glove. Only four outer glove perforations had matching inner glove perforations, thus indicating that in 82% of cases when the outer glove is perforated the inner glove will protect the surgeon's hand from contamination. The presence of visible skin contamination was also higher in perforation with the single gloving pattern (42.1%) than with the double gloving pattern (22.7%). An overwhelming majority of glove perforations (83.3%) went unnoticed. Double gloving was accepted by the majority of surgeons, especially with repeated use. It is recommended that double gloves are used routinely in all surgical procedures in view of the significantly higher protection it provides.

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*HSP Footnote:*



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