

Surgeon's satisfaction on the use of invented needle magnet in reducing the risk of sharp injuries in the operating room

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ABSTRACT

Background: Healthcare workers, especially operating room personnel, are at increased risk for sharps injury and transmission of blood-borne pathogens as a result of their occupation. Infection with these pathogens occurs mainly by percutaneous or mucocutaneous exposure to blood-borne pathogens. This study evaluated the effectiveness of using invented needle magnet in reducing the risk of sharp injuries in the operating room. **Materials and Methods:** The needle magnet device is consisted of three parts: a cap, a magnet and a metal container. It was invented by the authors for the first time in Iran. The average weight of this device is 200 g and it can be easily placed near the surgery field or on the myostand. It has magnetic properties that attracts the sharp pointed particles during surgery and preserve them in a protected space. The device was used in surgical field by 33 surgeons during 90 surgical operations. Then, the satisfaction of participants and effectiveness of the device in protection against sharps injury was evaluated by a questionnaire. **Results:** Thirty-one surgeons (94%) believed that needle magnet reduces dispersion of sharp instruments; 79% of the participants suggested that our device reduces sharps injury during operation; 29 surgeons (88%) intended to use this device during operation. Thus, the use of needle magnet within surgical field may reduce the chances of sharps injury during surgery. **Conclusion:** The use of needle magnet within surgical field reduces the chance of sharp injury during surgery and the surgeons were satisfied with its use.

Key words: Blood-borne pathogens, needle magnet, sharps injury, surgery

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INTRODUCTION

Surgeons and healthcare workers (HCWs) have always had a high risk of exposure to blood-borne pathogens as a result of their occupation. Infection with these pathogens occurs mainly by percutaneous or mucocutaneous exposure to blood-borne pathogens. Percutaneous exposure is particularly due to needle sticks or cuts from other sharp instruments contaminated with the blood of infected patients.¹

The risk of percutaneous and mucocutaneous exposure for operating room personnel has been investigated.

A cross-sectional study analyzed the incidence of occupational exposure to blood and body fluids (BBF) among 1144 hospital-based HCWs during April to May 2004. The total incidence of exposures was 66.3% of HCWs per year. The highest percentage of percutaneous injuries occurred during a surgical operation (22.8%). Among sharp instruments, the suture needle was the most common cause of percutaneous injuries (24.7%).² The risk of percutaneous injuries during 60583 operations was evaluated during another study. Operating room personnel reported 6.4 BBF exposures per 1000 surgical procedures. Increase in estimated blood loss, increased number of personnel working in the surgical field and increased surgical procedures duration were associated with higher risk of exposure. Suture needle-related exposures have a stronger association with the above factors.³

The prevalence and nature of intra-operative injuries to hand surgeons during hand surgery was evaluated among members of American Society for Surgery of the

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Hand (ASSH). The risk of sharp injury was 97% for a hand surgeon in practice for more than 10 years. The index finger of the left hand (94%) was the most likely site of injury. The suture needle was the most common cause (91% of cases).⁴ The incidence and reporting rate of needle-stick injuries was questioned from 42 surgeons in a general hospital in the UK. There were 840 needle-stick injuries over 2 years. Of the total number of injuries, only 19 (2.26%) were reported to Occupational Health.⁵

This study was conducted to determine the efficacy of inventory needle magnet used during surgeries.

MATERIALS AND METHODS

The needle magnet device consist of three parts: a cap, a magnet and a metal container [Figure 1]. The average weight of this device is 200 g and it can be easily placed near the surgery field or on the myostand. It has magnetic properties that attracts the sharp pointed articles during surgery and preserve them in a protected space. Thus, there would not be any hazards for the surgeon in presence of sharp pointed and cutting particles with the use of this device [Figure 2].

The device was successfully used during surgeries by 33 university faculty members within 90 operations such as general surgeries, neurosurgeries and urology, orthopaedic, obstetrics and gynaecologic surgeries. The operations were undertaken in two academic hospitals of Faghihi and Nemazee, affiliated to Shiraz University of Medical Sciences. The satisfaction of participating surgeons and the effectiveness of the device in protection against sharps injury were evaluated using a questionnaire. The items in the questionnaire included the effect of needle magnet on reduction in sharp objects dispersion, prevention of blood-borne pathogens transmission, reduction in needle-stick injuries during operation, capability for sharp devices

collection, effect on the duration of operation, technical difficulties induced by the device and, finally, satisfaction rate from device usage.

RESULTS

In our study, 33 surgeons participated, including 15 general surgeons, 8 gynaecologists, 5 urologists and 5 orthopaedic surgeons. Thirty-one surgeons (94% of all participants) believed that using needle magnet was effective in collection of sharp objects, reduced dispersion of such objects within the operation field and in removing the sharp devices at the end of operation. Twenty-eight surgeons (85%) considered that needle magnet would protect surgeons against blood-born pathogens. As many as 79% of participants believed that our device reduced sharps injury during operation, while 88% were satisfied with the use of this device. Twenty-nine surgeons (88%) intended to use the needle magnet during their operations. On the other hand, 48% and 30% of the surgeons believed that using this device prolonged the operation and induced technical difficulties, respectively.

DISCUSSION

Some policies have been proposed for lessening of sharps injuries during surgery. It include use of blunted suture needles for internal suturing-fascia/muscle,^{6,7} hands-free technique,⁸ double gloves wearing during surgery,^{9,10} and prohibition of HIV and HBV infected surgeons from procedures that have increased risk of exposure.¹¹

Our needle magnet device is a simple and cheap equipment that can efficiently reduce the risk of sharps injury that lead to transmission of blood-borne pathogens. The operating room is the hospital environment with the greatest concentration of sharp instruments. Mohrenschlager and colleagues presented a magnetic device that enabled the surgeon and other staff members working in the operating room to locate a lost needle on the floor rapidly.¹² Myers presented a magnetic sweeper

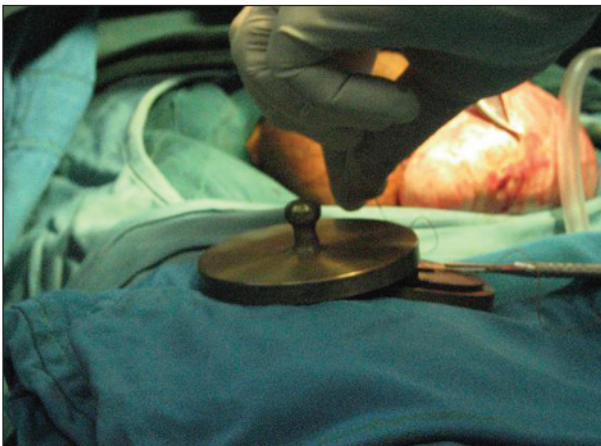


Figure 1: Needle magnet device consist of three parts: a cap, a magnet and a metal container



Figure 2: The surgeon has no hazards in using needle magnet device

to find and remove the suture needle without any risk of precutaneous injury and to avoid the anxiety of a missing surgical needle.¹³

Surgeons sustain most precutaneous injuries when they are suturing. The index finger of the non dominant hand is the most common part of body that is injured. Double gloving may decrease the risk of needle injury. The efficacy of double gloving in order to decrease risk of needle injury during major and minor orthopaedic surgeries was evaluated in a previous study.¹⁴ A total number of 1528 gloves (622 inner and 906 outer) used in 200 surgical procedures (100 major, 100 minor) and 100 pairs of unused gloves were examined. Overall perforation rate was 15.8%. Perforation rates for major and minor surgical procedures were 21.6% and 3.6%, respectively. The perforation rate for the unused control group was 1%. Inner and outer gloves perforation rates were 3.7% and 22.7%, respectively.¹⁴ In one study, the clinical use of a blunt suture needle and an absorbable skin staple in upper limb operation was evaluated. These needles may reduce the need for sharp needles during selected procedures on the upper limb.¹⁵

The hands-free technique for transferring sharp instruments is a work practice that has been proposed for reducing the risk of such contamination.¹⁶ In this technique, instruments are indirectly transferred between surgeons and other personnel so that only one person palpates the same sharp device at any time. Instruments are usually placed in a safe zone within the surgical field or a container, from where they can be retrieved.¹⁷

The National Alliance for the Primary Prevention of Sharps injury (NAPPSI) has published a list of needle-stick safety devices. The devices within each medical application have been categorized into primary and secondary prevention devices. Primary prevention devices are the first line of protection against needle-stick injury that reduces the use of sharps during surgery. Secondary prevention practices make the sharp items used within surgical field safer. The National Institute for Occupational Safety and Health (NIOSH) at the Centers for Disease Control and Prevention (CDC) has recommended that healthcare workers avoid the use of needles where safe and effective alternatives are available.¹⁸

Blunt-tip suture needles are identified by the Occupational Safety and Health Administration (OSHA) to reduce precutaneous injuries. Because as many as 59% of suture needle injuries happens during suturing of tissues under skin, replacement of conventional sharp-tip suture needles with blunt-tip suture needles for suturing of muscle and fascia will reduce the injury of surgical personnel. One CDC-based study in a gynaecological surgery field revealed a statistically significant reduction of injury if blunt-tip suture needles were used.¹⁹ Kunishige *et al.*,

have presented a surgical pearl that may reduce the risk of sharps injury during instrument hand-off and when retrieving instruments from the surgical tray.²⁰

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