
Students' Corner

Short Communication

Scalpel safety and new scalpel blade remover

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Abstract

Percutaneous injuries to surgical staff carry a reciprocal risk for patients, with potential for infection transmission from provider to patient. The operating room is the highest-risk setting for this mode of transmission because open wounds are susceptible to contamination, and injury to the hands of surgical staff resulting in bleeding is not uncommon. The traditional scalpel (surgical knife) has been extensively used in surgery for a number of years and would be the most widely used surgical instrument in the world at present. A conventional surgical scalpel comprises a reusable, sterile handle having a tang at one end on which a replaceable slotted blade is mounted. The handle is intended to be used repeatedly, but the blade is normally discarded after each instance of use. Removal devices are designed to protect the user and downstream staff from accidental injury when removing a scalpel blade from a reusable handle. Passing tray and single-handed scalpel blade remover. It is a primary object of the present invention (Patent No. 62851- 40294) to reduce or substantially eliminate the risk of changing scalpel blades. It is a further object of the present invention to simplify the removal of a scalpel blade from its handle.

Keywords: Scalpel safety, Scalpel blade remover.

Scalpel blade safety:

An estimated 384,000 percutaneous injuries are reported by health care workers in hospitals in the United States each year, placing them at risk of exposure to human immunodeficiency virus (HIV), hepatitis B virus (HBV), or hepatitis C virus (HCV).¹ In addition to the risk of illness and death after an exposure, psychological trauma and long-term disability are of great concern.

The operating room is the highest-risk setting for this mode of transmission because open wounds are susceptible to contamination, and injury to the hands of surgical staff resulting in bleeding is not uncommon. Since 1991 there have been 132 documented cases of health care worker-to-patient transmission of HIV, HBV, and HCV worldwide; 131 cases were transmitted during deeply invasive surgery.² The potential for reciprocal exposures is not rare; as many as 25% of injuries in surgery occur while the operator's hands are in contact with the surgical site.

A large majority of injuries (72.7%) were associated with only 3 devices. Suture needles were by far the most common cause of injury, accounting for 43.4% of all injuries; scalpel blades ranked second, accounting for 17.1%; disposable syringes accounted for 12.1%. The rank order of the top 3 devices was the same for all job categories. The remaining 27.3% of injuries were caused by a wide array of devices, mostly solid sharps used for cutting, clamping, retraction, and fixation (Data are from the Exposure Prevention Information Network {EPINet}).³

Scalpel injury was encountered in 12.2% surgeons, 12.5% surgical residents, 17.2% nurses, 21.1% technicians and 17.1% of all injuries. Attaching and removing blades from reusable handles caused a somewhat larger fraction of scalpel-related injuries (12.0%). A similar fraction of suture needle and scalpel blade injuries occurred after use, during or after disposal (11.3% and 14.4%, respectively).³⁻⁵

Removal devices are designed to protect the user and downstream staff from accidental injury when removing a scalpel blade from a reusable handle, passing tray and single-handed scalpel blade remover.

Based on the results of a retrospective review of 137

scalpel injuries detailed in hospital injury records, Fuentes et al⁶ modeled efficacy scenarios for theoretic injury prevention using a passing tray and single-handed scalpel blade remover compared with a safety scalpel under a variety of activation scenarios. Assuming a 100% activation rate and the effectiveness of the safety devices, use of a safety scalpel could have prevented a maximum of 72/137 (52.5%) injuries, whereas the use of a scalpel blade remover could have prevented 45/137 (32.8%) injuries. The combined use of a scalpel blade remover and passing tray could have prevented a maximum of 69/137 (50.3%) injuries. However, as many safety scalpels require user activation that cannot be assured, the theoretic protection offered by these devices was considered under a variety of activation rate scenarios. Table-3 demonstrates that the use of a singlehanded scalpel blade remover in conjunction with a passing tray would result in a lower rate of injury than an activated safety scalpel and may be up to 5 times safer than a safety scalpel that is not activated consistently.⁷

Single-hand scalpel blade remover and passing tray: Theoretic modeling data presented in one study indicated that the use of a single-handed scalpel blade remover in conjunction with a passing tray had the potential to prevent approximately as many injuries as a safety scalpel with a 100% activation rate. Ultimately, the effectiveness of an active device such as a safety scalpel where the user must activate the safety mechanism is dependent on the activation rate. Reported rates of activation for these devices are notoriously low, which may strengthen the evidence that passive safety devices such as passing trays and scalpel blade removers represent more effective interventions than those that require user activation, such as safety scalpels.⁷

Background of the invention:

The traditional scalpel (surgical knife) has been extensively used in surgery for a number of years and would be the most widely used surgical instrument in the world at present. To remove the blade from the handle, the heel portion of the slotted blade must be bent out of its plane (i.e. transversely to the handle), and then moved axially along the tang so that the heel portion rides over the tang thereby releasing the tang from the slot. Manual removal of the blade can be difficult, particularly when the scalpel is wet. Many devices have been developed in an effort to facilitate the removal of the blade from the scalpel, and to render the removal procedure less dangerous.

Summary of the invention:

It is a primary object of the present invention (Patent No. 62851- 40294) to reduce or substantially eliminate the risk of changing scalpel blades. It is a further object of the present invention to simplify the removal of a scalpel blade from its handle. A still further object of the present invention

is a completely autoclavable and chemically inert device for the removal of scalpel blades. Still another object of the present invention is to facilitate the disposal of used scalpel blades, direct handling of used blades being avoided at every stage of the disposal process.

The device consists of two parts that are connected to each other with a hinge (Figure-1). At the anterior edge of the upper plate there is an axial surface which has two clefts, one is for scalpel handle No 4 and the other one for scalpel handle No 3. There are two protuberances in the lower plate which have their complementary on the upper plate. One is for scalpel handle No 4 and the other one which is closer to the inlet of lower plate is for scalpel blade No 3. For using the device the scalpel blade is placed on the lower plate and on the related protuberance (No

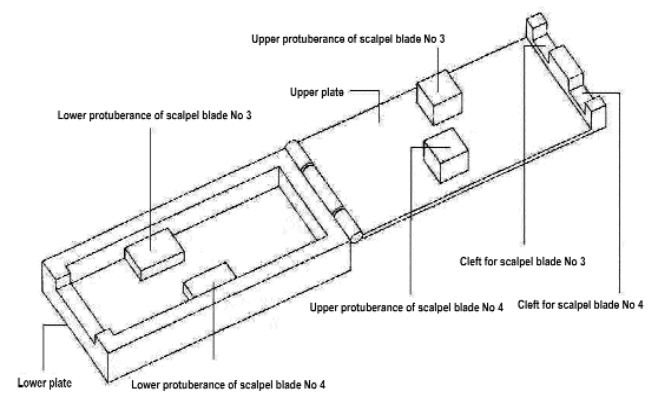


Figure-1: Different parts of the device.

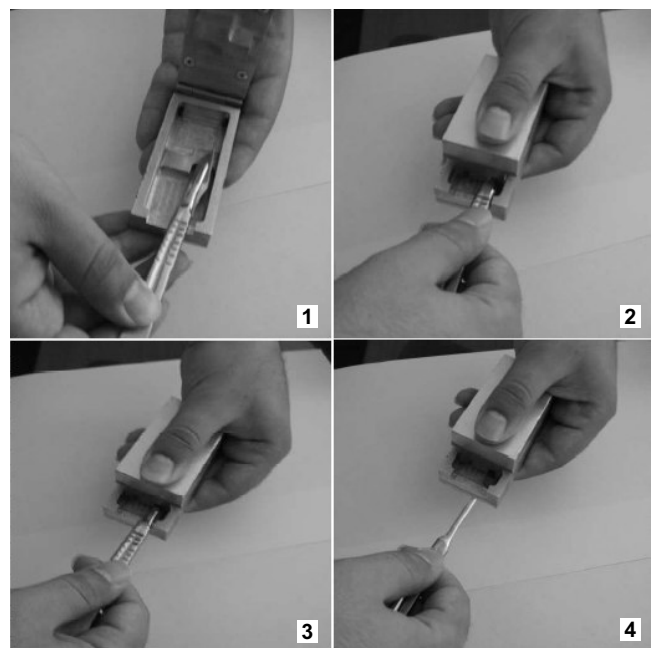


Figure-2: Step by step removal of scalpel blade by scalpel blade remover. (1): Insertion of the scalpel blade to the device, (2): Pitting down the upper plate, (3,4): Pulling out the scalpel.

3 or 4), and then the upper plate will locate on the first plate, in this situation the blade is fixed between the protuberances of the upper and lower plates that are complementary. In this position proximal part of the blade is located in the related cleft of the axial surface of upper plate and pushed down. In this position, the handle can be pulled out and the blade released safely with one motion (Figure-2). This device may be a good option for reducing the scalpel blade related injuries.

This device has two separate places for entering the different scalpels and designed in a manner to have a long life as no part of the device is exhausted by use. It consists of two parts formed by steel casting. This is the first approved invention by the national medical equipment center in Iran. After one year of using the device and evaluating its efficacy and safety it was declared safe as there was no report of injury.

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