

Needle stick injury

Reducing the risk

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Summary. *The incidence of penetrating skin wounds and needle penetration of gloves during operation was studied in orthopaedic surgeons. Significant hand wounds were found in 11% of surgeons before operations. Glove penetration during closure of the deep tissues occurred in 16% of outer gloves and 6% of inner gloves when standard needle points were used. The surgeon sustained a needle-stick injury in 6% of this group. When a needle with a protective point was used, there were no glove perforations. This simple precaution reduces the risk of transmission of blood-borne disease during operation.*

Résumé. *La fréquence des plaies profondes ainsi que la fréquence de la pénétration des gants d'orthopédiste par les aiguilles lors d'interventions chirurgicales font l'objet de cette étude. Dans 11% des cas, des plaies notables de la main existent avant l'intervention chirurgicale. La perforation des gants lors de la fermeture sous-cutanée a été trouvée dans 16% des gants extérieurs et dans 6% des gants intérieurs lorsque des aiguilles à pointes normales ont été utilisées. Le chirurgien a été blessé par l'aiguille dans 6% des cas de ce groupe. Aucune perforation de gant n'a été découverte lorsqu'une aiguille avec une pointe protégée a été utilisée. L'utilisation d'aiguilles à pointe protégée réduit considérablement le risque de transmission de maladies lors d'interventions chirurgicales.*

Introduction

There is a significant risk to medical staff of becoming infected with blood-borne diseases in the operating theatre [4]. Hepatitis B and HIV infection are widely recognised, but recent problems with hepatitis C suggest that there may be other diseases which could be transmitted in this way. A needle-stick is regarded as the most important mechanism, but skin surface and mucous membrane contamination by infected blood are recognised routes of HIV transmission [5]. The prevalence of HIV and AIDS is increasing in Ireland [3]. In New York, Lowenfel has estimated that surgeons have a 10% risk of HIV seroconversion from needle-stick injury over a 30 year period [4].

A recently developed taper point suture needle (Fig. 1) passes easily through fascia, muscle and fat, but does not penetrate skin or operating gloves. It has been successfully used for closure of fascia and fat in the operating theatre [7]. In this paper we assess the benefit of using this type of needle for deep wound closure in total hip replacement.

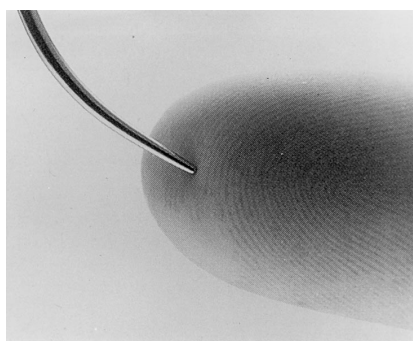


Fig. 1. A suture needle with a protective point

Material and methods

We studied the incidence of skin and glove penetration associated with deep wound closure in 68 primary total hip replacements during 3 months. The surgeons were tested before and after operation by washing their hands with a solution of methylated spirit (95%). A severe stinging sensation indicated significant penetration of the epidermis.

Each operation was randomly selected for closure with either standard pointed needles or needles with a protective point (Maxon Protec point, Davis & Geck, New York). Double gloves were worn at all times throughout the operation. Fresh outer gloves were put on before beginning deep wound closure and were changed before skin closure.

All the gloves worn by the operator were tested for perforations by filling each glove with water to a diameter of 10 cm at the palm [7]. The water was then expressed into each digit to a maximum diameter of 4 cm. A significant perforation was revealed by a jet of water.

All perforations were recorded and those on the outer glove correlated with those on the inner to determine whether both had been penetrated.

Results

In 7% of cases the surgeon felt an open hand wound present before operation when they washed their hands in alcohol solution.

Pointed needles

Sixty-four pairs of gloves used for closure of the deep tissues in the control group using standard pointed needles were tested. Punctures were found in 16% of the outer and 6% of the inner gloves. A needle-stick injury occurred in 6%; the surgeon was aware of this in every case and the alcohol test was positive.

Protected point needles

These needles were used in 36 deep closures and no glove or skin perforation occurred. The reduction of needle-stick injury is significant (Fischer's exact test, $p = 0.026$). The surgeons did not have any difficulties using the needle.

Discussion

Direct inoculation of another person's blood into the dermis through a needle jab is a well recognised route for the transmission of blood-borne diseases [5]. Our method of detecting such injuries by washing in alcoholic solution has not been previously described. The alcohol stimulates sensory receptors in the dermis producing a stinging sensation. The test discriminates between significant intradermal inoculation and minor trauma

sustained during operation which penetrates the gloves but not the dermis. When used before operation, a positive test coincided with known wounds on the surgeon's hands.

Primary target cells for the human immunodeficiency virus are present in the skin [1]. HIV inoculation has been reported when infected blood has been splashed on intact skin, as well as in the presence of open wounds. Thus, perforation of gloves without penetration of the epidermis could allow blood to seep into the gloves which is a potential route for the transmission of disease. Our observation that a needle may penetrate an outer glove without going through the inner glove has been previously reported [6]. A suture needle with a protective point abolished glove puncture in our study.

Meticulous surgical technique and the correct handling of instruments are essential in preventing inoculation with blood borne disease in the operating theatre. The glove perforation rate of 16% in our series compares favourably with the finding that such perforations occur in up to 48% in major general surgical operations, mostly during wound closure [2].

The use of a suture needle with a protected point is a simple and effective measure which reduces the risk to the operating surgeon of contracting blood-borne diseases from needle-stick injuries.

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