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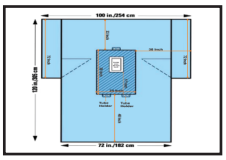
THE PASSAGE OF BACTERIA THROUGH SURGICAL DRAPES.



The passage of bacteria through surgical drapes is a potential cause of wound infection. Previous studies have shown that liquids and human albumin penetrate certain types of drapes. We studied the passage of bacteria through seven different types of surgical drape and an operating tray. Bacteria easily penetrated all the woven re-usable fabrics within 30 min. The disposable non-woven drapes proved to be impermeable, as did the operating tray. We recommend the use of non-woven disposable drapes or woven drapes with an impermeable operating tray in all surgical cases.

Infection remains a problem despite modem aseptic surgical techniques and the routine use of antibiotics. There is also growing concem over the infection of healthcare workers by patients, particularly those with the hepatitis and human immunodeficiency viruses (HIV). It has been postulated that acquired immunodeficiency syndrome (AIDS) can be acquired by skin contact with HIV-infected blood. Braathen et al. suggested that HIV has an affinity for the Langerhans' cells of the skin9 and, in 1987, the Centers for Disease Control reported three cases of non-percutaneous transmission of HIV in healthcare workers.

In the operating theatre, infective organisms can be spread either directly by means of instruments, hands and penetration of drapes and gowns, or indirectly through air contamination. Whyte et al. and Hubble et al. have shown that air contamination, caused by shedding of bacteria by theatre personnel, is a significant cause of wound contamination. They suggested special clothing with occlusive cuffs to prevent shedding.

The passage of bacteria through surgical drapes poses a major concern. Mackintosh and Lidwell performed experiments to determine the resistance to penetration by aqueous fluids of certain materials commonly used to make surgical drapes. Untreated woven fabrics are rapidly penetrated; non-woven synthetic materials resisted longer and tightly woven cotton fabrics resisted the longest.Ha'eri and Wlley used human albumin microspheres labelled with Tc as tracer particles to determine the permeability of drapes. The particles penetrated woven drapes, but not non-woven drapes. This study does not take into account the physical and biological differences between albumin and bacteria. These differences may affect rates of penetration.

Using a new method to assess the permeability of fabrics, we performed an experiment to determine the passage of Streptococcus viridans and coagulase-negative Staphylococci spp. (common skin commensals) through various wet surgical drapes.

Table 1 Results of experiment

Drape type	Bacterial growth of Staph. and Strep. at:		
	30 min	60 min	90 min
Non-woven, single use materials			
Isobac Optima	None	None	None
Absorbant barrier	None	None	None
Adhesive operating towel	None	None	None
Woven re-suable materials			
100% Continuous filament polyester with fluorocabon	Heavy	Heavy	Heavy
Dense woven 50% Polyester / 50% cotton	Heavy	Heavy	Heavy
Ordinary weave 50% polyester / 50% cotton	Heavy	Heavy	Heavy

Materials and Methods

We tested seven types of surgical drapes that are in common use in operating theatres in the Bristol hospitals, as well as a PVC operating tray. Twenty-four round agar plates, with a diameter of 90 mm, were prepared by filling them to the brim with Columbia agar (Becton Dickenson, Oxford, UK) containing 8% whole horse blood (TCS Microbiology). The plates were inoculated with 10 colony forming units of Strep. viridans and coagulase-negative Staphylococcus and incubated in air at 37°C for 18 h. The plates were divided into eight sets of three plates. A set of agar plates was assigned to each type of drape to be tested. A sterile section of drape was placed over each agar plate. Each drape was then wet with 15 ml sterile normal saline placed with a sterile pipette over the centre of each agar plate.

Twenty-four square agar plates, 100 mm x 100 mm in size, were filled to the brim with blood agar. Each of these plates was inverted and placed over a round agar plate. After 30, 60 and 90 min, a square agar plate was removed from each set and incubated for 48 h. All the square plates were inspected for growth of Strep. viridans and coagulase-negative Staphylococci spp. The experiment was then repeated a second time to check for reproducibility.

Results

Scanty growth was defined as less than 10 colonyforming units. Moderate growth was defined as 10-10 colony-forming units. Heavy growth was defined as >10 colony-forming units. All of the reusable woven drapes allowed penetration by bacteria within 30 min. Drapes made of non-woven synthetic materials were impermeable (Tables 1).

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