



Anaesthesiology

To evaluate the efficacy of Povidone-Iodine 5% solution per se and to compare it with Surgical Spirit (Alcohol 95%) for skin disinfection prior to Subarachnoid Block, a prospective randomized controlled trial.

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ABSTRACT

Context: We wanted to evaluate the commonly used antiseptics Povidone iodine 5% and Surgical spirit. Aim: To evaluate the efficacy of Povidone Iodine 5% solution per se and to compare it with Surgical Spirit for skin disinfection.

Settings and design: A prospective randomized controlled trial in elective operation theatre in a tertiary care hospital. **Methods:** Sixty adult patients coming for elective LSCS were enrolled. Skin swabs were collected before and after antiseptic solution being applied prior to sub arachnoid block and incubated in blood agar at 35degree Celsius for 24 hours. **Statistical methods:** Students t test, p value <0.05 was considered as significant. **Results:** No organism was grown after the application of antiseptics in both the groups. **Conclusion:** In our study both the 5% Povidone Iodine solution and the Surgical spirit (absolute alcohol 95%) were equally effective for cutaneous antiseptics.

KEYWORDS : Surgical spirit, Povidone iodine, Antiseptics

Introduction:

Infectious complications following Neuro axial procedures represent serious threat to the patient. The quoted incidence of bacterial infectious complications following sub arachnoid or epidural anesthesia was 1.1 per 1,00,00⁽¹⁾. Human skin flora is a potential source of epidural abscess. The infectious risk increases only after some threshold level of skin colonization. In one study surrounding skin was the source of all microorganisms grown from epidural catheter⁽²⁾. Thus effective cutaneous antiseptics can significantly reduce the infectious complications. Povidone Iodine solution which is commonly used may not completely eliminate all bacteria from skin and the disinfection may be of a limited duration. Blood and other proteinaceous material may neutralize or inhibit its effect⁽³⁾. Since its mechanism of action requires continuous release of Iodine, the onset to maximal action requires several minutes. Acute skin reactions may occur with Povidone iodine. So we wanted to evaluate the actual efficacy of Povidone iodine 5%. Alcohol is widely used, provides rapid antiseptics and may prolong the effect of other disinfectants. Surgical spirit and Povidone iodine 5% are commonly used for cutaneous antiseptics. Therefore we planned to conduct a study to evaluate the efficacy of Povidone Iodine 5% solution per se and to compare it with Surgical Spirit (alcohol 95%).

Materials and methods:

After obtaining Institutional Ethical Committee, this prospective randomized controlled trial was conducted in a tertiary care hospital over a period of nine months. After obtaining prior informed consent sixty consecutive adult patients in the age group of 20-30 years coming for elective LSCS who are planned for Sub Arachnoid Block were enrolled for the study. Patients who refused, h/o local anesthetic toxicity or infection at the proposed site of needle entry were excluded from the study. Patients were divided by computer generated random numbers into two groups, group A and B. Group A patients skin will be disinfected with Povidone iodine 5% solution. Group B patients skin will be disinfected with Surgical Spirit (absolute alcohol 95%). Before giving subarachnoid block the Anesthesiologist took all aseptic precautions like thorough hand washing, sterile gowns, gloves etc.. Patient's skin was disinfected with rigorous cleaning by the selected antiseptic agents for two minutes and allowed to dry. Skin swab was taken before and after the application of antiseptic agents at the pretended lumbar puncture site. Blood samples after appropriate labeling were immediately sent to Microbiology Department and incubated in Blood Agar at 35 degree Celsius for 24 hours. However as per our institutional protocol after taking both the skin swabs, it was made sure that all the patients received both the antiseptics prior to actual lumbar puncture. The Microbiologist who studies the culture plate was unaware of the

group it belongs. The growth if any was noted and the organism species were identified. We planned to observe Contact time of antiseptics, any signs of Neuro toxicity, meningeal infection and skin allergy.

Results:

Demographical data were similar in both the groups. In both the groups patients were only females. Surgical spirit group and Povidone iodine group has similar ages of the patients, which is statistically not significant (Mean±SD 25.50±1.74 vs 25.40±1.98, P=0.8358). Many organisms were grown from the skin prior to antiseptics application (Table 1). However they were only gram positive commensals found in the normal skin flora. None of the cultures had grown pathogenic bacteria. In many patients skin swabs were negative even before the antiseptic application. No organism was grown in any of the skin swab after antiseptic application in both the groups. No skin reactions, Neuro toxicity or meningeal infections were observed in any of the patient after antiseptic application.

Table 1

Organisms grown	Surgical spirit group	Povidone Iodine group	P value
Gram positive cocci	9	8	Not significant
Miscellaneous	1	1	
Negative swabs	20	21	
Mean	15.0	15.0	
SD	7.07	8.49	

The contact time was much shorter in Surgical spirit group compared with Povidone iodine group (Table 2). In surgical spirit group Vs Povidone iodine group, it was (35.97±1.4 Vs 115.97±1.4), with a P value <0.0001 which is statistically significant.

Table 2

Contact time (seconds)	Surgical spirit group	Povidone iodine group	P value
Mean time	35.97	115.97	<0.0001SD1.41.4SEM0.260.26N3030

Discussion:

There are several mechanisms proposed for epidural infection following neuroaxial procedures. Skin flora may be delivered to deeper tissues at the time of needle entry or bacteria can migrate inside via the needle track later. This has been implicated as a potential source of epidural abscess⁽²⁾. Viable microorganisms can be isolated from skin even after the application of strict antiseptics and contamination by skin flora may be a mechanism for epidural

infection⁽⁴⁾. Although hematogenous spread from other infectious site is a theoretical possibility Darchy et al in their study in ICU patients had shown microorganisms isolated from epidural catheters were different from other site cultures and stated that other infectious sites are not the source for epidural abscess⁽⁵⁾. These show the importance of the cutaneous antiseptics. The properties of ideal antiseptic includes widespread action, immediate onset of action, longer duration of action, lesser toxic effects to skin and lack of inactivation by proteinaceous material. However controversy still exists regarding the ideal anti septic solution before regional blockade.

The commonly used antiseptics are Alcohols (70-90% v/v), Chlorhexidine (0.5 to 4% w/v) and Povidone iodine (5-10% w/v). Among these alcohols are most active but lacks residual action, whereas the Chlorhexidine and Povidone iodine are less active but has persistent actions⁽⁶⁾.

Chlorhexidine is active against almost all pathogenic bacteria and yeasts. It can penetrate deeper into hair follicles and its action last for hours and its action is not affected by the presence of proteinaceous material. It doesn't sensitize the skin. These properties are in contrast to Iodine. Some authors in their study concluded that Chlorhexidine should be the first consideration for skin preparation⁽⁷⁾. However in a systematic literature review they found that the perceived efficacy of Chlorhexidine in majority of the studies is because of its combination with alcohol. And they couldn't find any evidence that Chlorhexidine alone is effective⁽⁶⁾. There may be dose dependent neurotoxic risk associated with Chlorhexidine use⁽⁸⁾. Even though approved for cutaneous antiseptics prior to surgery, Chlorhexidine has not received approval by Food Drug Administration (FDA) for use before regional anesthesia⁽⁹⁾. So we did not include Chlorhexidine in our study.

Alcohol when used alone for cutaneous antiseptics is fast and short acting; it has broad-spectrum antimicrobial activity and is relatively inexpensive⁽¹⁰⁾. Because alcohol dries within moments of application on skin, it can be used as a 1 step application instead of paint and scrub technique.

All our patients routinely took thorough bath on the morning of surgery and receive routine preoperative antibiotics on the day of surgery. This may explain many of the negative skin swabs even before antiseptics application. However many organisms were grown immediately prior to antiseptics application and no organism could be grown after the antiseptic application. This immediate effect can be attributed only to the action of the antiseptics.

Predominant organisms grown in the cultures before the application of the antiseptics were gram positive micrococci in both the groups. Only mild growth was seen in all the positive cultures. Pathogenic organisms like staphylococcus aureus, Methicillin resistant staphylococcus aureus, B hemolytic streptococci were not grown in our culture swabs.

In fact bacterial growth has been reported in contaminated Povidone iodine solution bottles^(6,11). But in our study no organism was grown from the skin swabs in Povidone iodine group.

Kulkarni AP Awode RM in their study couldn't find any difference in terms of efficacy or side effects between 2% Chlorhexidine in alcohol and 10% Povidone iodine⁽¹²⁾. Our study findings are consistent with them and in fact we found 5% Povidone iodine is effective for cutaneous antiseptics prior to Neuro axial procedures. The limitation in our study is that all our patients were elective patients who took thorough skin bath on the morning of surgery. This is evident in our observation that many skin swabs were negative even before antiseptic application. Therefore the perceived efficacy of 5% Povidone iodine may not be persistent when the microbial load on the skin is high like when patients coming for emergency surgeries. Therefore further studies are needed to evaluate the efficacy of 5% Povidone iodine solution.

Conclusion: In our study both the 5% Povidone Iodine solution and the Surgical spirit (absolute alcohol 95%) were equally effective for cutaneous antiseptics prior to Neuro axial procedures and eliminated all the organisms that can be grown from skin swabs. Because of its shorter contact time Surgical spirit may be preferable for cutaneous antiseptics with intact skin especially in emergency situations.

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Conflict of interest: Nil declared.

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