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A COMPARATIVE STUDY AND ASSESSMENT OF BURN WOUND SEPSIS USING SURFACE SWAB, FINE NEEDLE ASPIRATION AND WOUND BIOPSY CULTURES

Prema Dhanraj, Philip Korula, M K Lalitha and Sulochana Stanley
Dept of Plastic Surgery, CMC Hospital, Vellore

*SUMMARY: **The purpose of this study was to evaluate a simple standardized fine needle aspiration method for bacteriologic assessment of burn wound and to determine whether this method is as reliable and useful as the classic invasive biopsy culture method[1]. Considering the high correlation with the organism in all three methods, viz. swab, aspiration and wound biopsy culture techniques, we feel fine needle aspiration culture has a place in bacteriological assessment of burn wound as it is simple, easy and less painful compared to the more conventional wound biopsy culture technique.***

INTRODUCTION

Burn infection continues to be the most common problem influencing the clinical course of the patient[2]. Evaluation and treatment of the organism in the burn wound as early as possible is of utmost importance and this requires a method which is simple, easy, less painful and as reliable as conventional wound biopsy culture technique. We describe our experience with 25 patients who had their wound cultured using needle aspiration technique.

MATERIAL AND METHODS

The present study includes samples from 25 patients with deep 2° and 3° fresh burns involving 20-90% total body surface area. Standardized surface swab, burn wound biopsy, blood culture and needle aspiration culture, were taken on 12th post burn day. Pus swab for culture sensitivity was done routinely whereas the aspirate and biopsy count were expressed as a number of bacteria per ml of aspirate and per gram of tissue respectively. Results between the techniques was then formulated. All patients were treated from the time of admission with topical silver sulphadiazene cream. Patients developing 10^5 or more organizm per gram of burned tissue were considered to have positive biopsy.

Method

1. Burn wound is wiped using a dry gauze 6 hours before sampling
2. No surgical preparation or local anaesthesia given
3. Swab is gently rubbed on the burn wound over a 1 cm area
4. Using a 2 ml syringe and a 20 gauge needle, 2 ml of normal saline is injected into the subeschar space and immediately the fluid is aspirated for culture. Usually about 0.5 ml of the fluid can be aspirated which is transported to the microbiology laboratory in the same syringe with a sterile cork
5. One inch away from the injection site a wound biopsy is taken by making two parallel incisions 1 x 1 cm in length and width. The tissue is removed to a depth to include unburned subcutaneous tissue[3]
6. Blood cultures are taken from unburned surface when possible to prevent contamination

Processing

Undiluted aspirate is streaked into Blood agar and McConkey agar. The fluid is diluted with normal saline ranging from 1:10-1:100,000 and floral quantitation is done on Blood agar and McConkey agar ranging from 10^1 to 10^5. Bacterial counting is done after incubating the plates at 35°C for 18 to 24 hours with different dilutions and a smear is made for different colonies and Biochemical and antibiotic susceptibility tests is performed on different type of colony.

RESULTS

A number of organisms were cultured using the three techniques. The commonest organisms were pseudomonas, coagulase negative staphylococci, non-fermenting gram negative bacilli, E.coli, staph aureus, proteus and klebsiella. A high correlation was found with the organism in all three methods as shown in Table I.

ORGANISMS CULTURED IN ORDER OF FREQUENCY

TABLE I

	Organism cultured	Total No.	Tissue culture	Aspiration culture	Swab
1	Pseudomonas sps.	40	16	12	12
2	Coagulase negative staphylococci	23	6	7	10
3	Non fermenting gram negative bacilli	20	9	4	7
4	E. coli	13	4	4	5
5	Staph aureus	12	7	2	3
6	Proteus	12	4	3	5
7	Klebsiella	11	4	1	6
8	Strepto faecalis	9	3	2	4
9	Beta hemolytic streptococci	1	0	1	0

Out of 25 patients 15 had positive wound biopsies (10^5) 8 patients had negative biopsy, one patient had no growth and biopsy was not done in one patient. 14 of the 15 patients with positive biopsies subsequently developed clinical signs of septicaemia. Needle aspiration culture was done in 24 patients, 12 patients had bacterial count of greater than 10^3 organism per ml of aspirate. 6 of the 12 patients with positive wound culture (10^3) subsequently developed septicaemia. It is showed that the aspiration culture were numerically related to biopsy culture of the wound and that the critical number of 10^5 bacteria per gram of tissue corresponded to approximately 10^3 bacteria per ml of aspirate. 13 patients had blood culture taken at the time of wound biopsy 5 patients had positive blood culture 4 of whom had a single organism and 1 patient had a combination of two organisms. Correlation of positive blood culture with quantitative culture was present in only 5 of the 13 patients, illustrating that bacteremia may not be demonstrable in patients with clinical manifestation of burn wound sepsis [4]

The sensitivity of aspiration technique was 61% where as the specificity was 85% as shown in Table II. As can be seen in Table No.III those who were positive for sepsis showed a high specificity (85%). Similar results were also obtained with wound biopsy as seen in table No.IV However when comparing Needle Aspiration with Wound Biopsy the sensitivity and specificity were low. From the above 3 tables it can be inferred that the Needle Aspiration Culture correlates better with sepsis than with wound biopsy.

TABLE II

		SEPSIS		
		Infection positive	Infection negative	
Aspiration Culture 103	Pos	11	1	12
	Neg	7	6	13

$$\text{Sensitivity} = \frac{11}{18} = 61\%$$

$$\text{Specificity} = \frac{6}{7} = 61\%$$

Coefficient of agreement between clinical signs of sepsis and aspiration technique.

TABLE III

		WOUND BIOPSY		
		positive	negative	
Aspiration Culture 103	Pos	8	4	12
	Neg	7	6	13

$$\text{Sensitivity} = \frac{8}{15} = 53\%$$

$$\text{Specificity} = \frac{6}{10} = 61\%$$

Correlation of bacterial sensitivity and specificity between the biopsy and aspiration technique

TABLE IV

		Aspiration Culture{103}		Wound Biopsy	
		Pos	Neg	Pos	Neg
Clinically Sepsis Positive	18	11	7	14	4
Clinically No Sepsis	7	1	6	1	6
Total	25	12	13	15	10

Correlating the results with clinical findings

DISCUSSION

Needle aspiration culture technique appears to offer significant advantage over other techniques such as blood culture, surface culture and wound biopsy culture.

Blood culture although helpful are of only limited value due to the frequent absence of bacteremia, surface culture technique fail to predict accurately the presence or progression of burn wound sepsis, and wound biopsy is a painful surgical technique[5]. Using the relatively simple technique described we have been able to detect, quantitate and evaluate the progression of burn wound colonization. Finally the simplicity of this method has permitted us to make it an integral part of our routine burn care.

CONCLUSION

1 Aspiration technique measures the same type of organism as biopsy technique

2 It is simple, easy, painless yet sensitive and specific for bacterial quantitation in burn wound

3 Correlation of bacterial sensitivity and specificity between the tissue biopsy and aspiration culture would indicate that the tissue biopsy technique may no longer be required for infection monitoring in the burn wound.

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Authors

Dr. Prema Dhanraj B.Sc, MS, MCh, Associate Professor
Dr. Philip Korula MS, MCh, MNAMS, Professor

Dept of Plastic Surgery, Christian Medical College & Hospital, Vellore, India.

Dr. M K Lalitha MD (Micro) Professor
Dr. Sulochana Stanley B.Sc, DMM, Selection Grade Microbiologist

Dept of Microbiology, Christian Medical College & Hospital, Vellore, India.

Requests for reprints to Dr. Prema Dhanraj, Dept of Plastic Surgery, CMC Hospital, Vellore.

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