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Assessment of Bacterial Profile of Pus Samples Obtained From Patients Undergoing Surgical Procedures: An Observational Study

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Abstract

Background: Wound infection may initially be manifest as bacterial colonization, and it is only when colonization is combined with other factors, such as decreased vascular supply, intrinsic virulence of specific bacteria (eg, Staphylococcus aureus), and host immune factors, that true infection occurs. Hence; we planned the present study to assess bacterial profile of pus samples obtained from patients undergoing surgical procedures. **Subjects and Methods:** The present study included assessment of 30 pus samples sent from the surgery department, to the microbiology department. Collection of pus samples was done from the infected wounds. Detailed demographic data of all the patients was obtained. In the microbiology department, for studying the morphological profile of the clinical isolates, gram staining was done. Streaking of the pus samples was done on the blood agar, and MacConkey agar followed on incubation aerobically at 37 degree centigrade for 24 hour. Identification of microorganisms was done based on colonial morphology and pigment production. All the results were compiled and analysed by SPSS software. **Results:** Staphylococcus aureus was the most commonly isolated bacteria in the present study. Other bacteria's obtained in the present study included Pseudomonas aeruginosa, Klebsiella species, Escherichia coli, Enterococci species and Enterobacter species. **Conclusion:** Most common organism isolated from pus discharge from infected wounds is S. aureus.

Keywords: Bacteria, Pus, Surgery.

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Introduction

Wound infections are responsible for considerable morbidity and significantly contribute to the escalation in the cost of health care.[1,2] Wound infection may initially be manifest as bacterial colonization, and it is only when colonization is combined with other factors, such as decreased vascular supply, intrinsic virulence of specific bacteria (eg, Staphylococcus aureus), and host immune factors, that true infection occurs.[3,4] It is widely recognised today among surgeons that anaerobic Gram-negative organisms of the Bacteroides species are deeply implicated and probably causal in the majority of infections involving abdominal wounds. Many recent reports have unequivocally demonstrated the frequent presence of Bacteroides in pus taken from established wound infections.[5] Hence; we planned the present study to assess bacterial profile of pus samples obtained from patients undergoing surgical procedures.

Subjects and Methods

The present study was commenced in the department of general surgery and microbiology of the medical institute and it included assessment of 30 pus samples sent from the surgery department, to the microbiology department. Collection of pus samples was done from the infected wounds. Detailed demographic data of all the patients was obtained. In the microbiology department, for studying the morphological profile of the clinical isolates, gram staining was done, based on criteria described previously in the literature.[6]

Streaking of the pus samples was done on the blood agar, and MacConkey agar followed on incubation aerobically at 37 degree centigrade for 24 hour. Identification of microorganisms was done based on colonial morphology and pigment production. Further confirmation of the isolated bacteria was done based on various biochemical tests. All the results were compiled and analysed by SPSS software. Chi- square test was used for assessment of level of significance.

Results

A total of 30 patients were analysed in the present study. Among these thirty patients, 40 percent belonged to the age group of 41 to 50 years. 30 percent of the patients belonged to the age group of 30 to 40 years. Mean age of the patients of the present study was 44.8 years. There were 21 males and 9 females in the present study. In 6 cases each, site of

surgery was limb and skin. In 5 cases each, site of surgery was abdomen, back and legs. In 3 cases, the site of surgery was naso-pharynx. Staphylococcus aureus was the most commonly isolated bacteria in the present study. Other bacteria's obtained in the present study included Pseudomonas aeruginosa, Klebsiella species, Escherichia coli, Enterococci species and Enterobacter species.

Table 1: Age-wise distribution of patients

Age-group	Number of patients	Percentage of patients
Less than 30	3	10
30 to 40	9	30
41 to 50	12	40
51 to 60	6	20
Total	30	100

Table 2: Gender-wise distribution of patients

Gender	Number of patients	Percentage of patients
Males	21	70
Females	9	30
Total	30	100

Table 3: Distribution of patients according to site of surgery

Site of surgery	Number of samples	Percentage of samples
Abdomen	5	16.7
Skin	6	20
Limb	6	20
Back	5	16.7
Both legs	5	16.7
Nasopharynx	3	10

Table 4: Prevalence of bacterial isolates

Organisms	Number of isolates	Percentage
Staphylococcus aureus	10	33.3
Pseudomonas aeruginosa	6	20
Klebsiella species	4	13.3
Escherichia coli	3	10
Enterococci species	2	6.7
Enterobacter species	2	6.7
Others	3	10

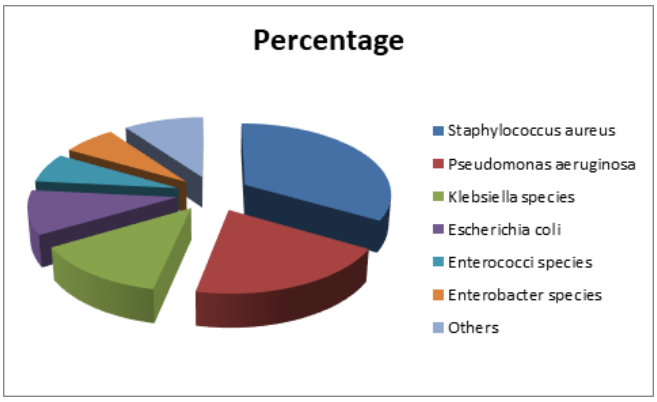

Figure 1: Prevalence of bacterial isolates

Discussion

The microbiology of chronic wounds is complex, and it is difficult to discern which bacteria are culpable. Deep cultures or quantitative biopsies of wound tissue may be necessary. In some instances, such as in the presence of certain mycobacteria, isolation of specific organisms confirms causation. In many instances, it is appropriate to treat these wounds empirically with a combination of topical antiseptics and systemic antibiotics, especially in the presence of invasive infections.[6,7]

Staphylococcus aureus is the microorganism most commonly cultured from surgical site infections. When a viscus, such as the large bowel, is opened, tissues are likely to be contaminated by a whole range of organisms. For example, after colorectal surgery enterobacteriaceae and anaerobes are encountered and may act in synergy to cause surgical site infections (SSI).[8]

A total of 30 patients were analysed in the present study. Among these thirty patients, 40 percent belonged to the age group of 41 to 50 years. 30 percent of the patients belonged to the age group of 30 to 40 years. Mean age of the patients of the present study was 44.8 years. There were 21 males and 9 females in the present study. In 6 cases each, site of surgery was limb and skin. In 5 cases each, site of surgery was abdomen, back and legs. In 3 cases, the site of surgery was naso-pharynx. Green JW et al evaluated the increased hospital stay and direct cost of hospitalization that resulted from a postoperative wound infection (presence of pus at the incision site) after each of 6 common operations. With the aid of the hospital computer, matched controls were obtained with respect to patient age, sex, exact operation performed, clinical service performing operation, pathologic finding, and underlying disease process which might alter the patient's predisposition toward infection. Several of the operations (appendectomy. cholecystectomy, total abdominal hysterectomy, and coronary artery bypass graft) were subtyped in order to obtain equivalence between controls and infected patients. In general, an infection doubles the postoperative stay and significantly increases the hospital expense.[9]

Staphylococcus aureus was the most commonly isolated bacteria in the present study. Other bacteria's obtained in the present study included Pseudomonas aeruginosa, Klebsiella species, Escherichia coli, Enterococci species and Enterobacter species. Kasatpibal N et al estimated the extra charge and excess postoperative hospitalization attributable to SSI in six surgical operative procedures comprising appendectomy, herniorrhaphy, mastectomy, cholecystectomy, colectomy, and craniotomy. The study used one-to-one matched-pair strategy to compare case (patient with SSI) and controls (patient without SSI). The matching criteria were same final diagnosis, same operative procedure, and same American Society of Anesthesiologists (ASA) score. Data were calculated for mean difference, median difference, and 95% confidence intervals (95% C.I) of hospital charge and postoperative stay. The study could identify 140 matched-pairs of case and control. When compared to matched controls, cases had higher hospital charge and greater postoperative length of stay. Mean of

extra hospital charge attributable to SSI was 43,658 (95% C.I; 30,228-57,088) baht and mean of excess postoperative stay was 21.3 (95% C.I; 16.6-26.0) days. Median of extra expenditure was 31,140 (95% CI; 17,327-49,081) baht and median of prolongation of postoperative stay was 14 (95% C.I, 12-18) days. This study supported the findings of the previous published reports that patients who have SSI incur enormous excess cost and hospital stay.[10] Hasselgren PO et al assessed 1243 operations and found that the rate of postoperative wound sepsis was 9.3%. Factors associated with high infection rate were high age, emergency operations, long duration of surgical procedure, potentially contaminated and contaminated operations, diabetes and treatment with steroids. The frequency of wound sepsis was also increased in patients with long preoperative hospital stay or 12.5% as compared to 4.5% in patients with a preoperative stay of one day. These data indicated that long preoperative hospitalization is not in itself a causative factor in wound infections, but might be related to other factors associated with increased likelihood of wound sepsis.[11]

Conclusion

Under the light of above obtained data, the authors conclude that most common organism isolated from pus discharge from infected wounds is S.aureus. Antibiotic testing should be done in the pus samples for better treatment results. However; further studies re recommended.

References

1. Faraday N, Rock P, Lin EE, Perl TM, Carroll K, Stierer T, Robarts P, McFillin A, Ross T, Shah AS, et al. Past history of skin infection and risk of surgical site infection after elective surgery. Annals of surgery. 2013;257(1):150–4.
2. Keenan JE, Speicher PJ, Thacker JK, Walter M, Kuchibhatla M, Mantyh CR. The Preventive Surgical Site Infection Bundle in Colorectal Surgery: An Effective Approach to Surgical Site Infection Reduction and Health Care Cost Savings. JAMA surgery. 2014 Epub 2014/08/28.
3. Leaper D1, Assadian O2, Edmiston CE3. Approach to chronic wound infections. Br J Dermatol. 2015 Aug;173(2):351-8. doi: 10.1111/bjd.13677. Epub 2015 Mar 15.
4. Tickle J1. Wound infection: a clinician's guide to assessment and management. Br J Community Nurs. 2013 Sep;Suppl:S16, S18-22.
5. Hunt TK1, Hopf HW. Wound healing and wound infection. What surgeons and anesthesiologists can do. Surg Clin North Am. 1997 Jun;77(3):587-606.
6. Collee JG, Miles RS, Watt B. Tests for identification of bacteria. In: Collee JG, Duguid JP, Fraser AG, Marmion BP, Simmons A (eds). Mackie and McCartney Practical Medical Microbiology. 14th ed, India: Churchill Livingstone, pp.131- 149, 2007.
7. Roux A, Payne SM, Gilmore MS. Microbial telesensing: probing the environment for friends, foes, and food. Cell host & microbe. 2009;6(2):115–24.
8. Flack CE, Zurek OW, Meishery DD, Pallister KB, Malone CL, Horswill AR, Voyich JM. Differential regulation of staphylococcal virulence by the sensor kinase SaeS in response to neutrophil-derived stimuli. Proceedings of the National Academy of Sciences of the United States of America. 2014;111(19):E2037–45.
9. Green JW, Wenzel RP. Postoperative wound infection: a controlled study of the increased duration of hospital stay and direct cost of hospitalization. Ann Surg. 1977;185(3):264-8.
10. Kasatpibal N1, Thongpiyapoom S, Narong MN, Suwalak N, Jamulitrat S. Extra charge and extra length of postoperative stay attributable to surgical site infection in six selected operations. J Med Assoc Thai. 2005 Aug;88(8):1083-91.
11. Hasselgren PO, Säljö A, Fornander J, Lundstam S, Seeman T. Postoperative wound infections in patients with long preoperative hospital stay. Acta Chir Scand. 1982;148(6):473-7.

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