Original Research Paper Microbiology

Bacteriology of Deep seated Abscesses with Special reference to Anaerobes

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ABSTRACT

Background: The current study witnesses the changing trends in the organisms that are being isolated from vario abscesses at different sites and also the increasing prevalence of anaerobes in these samples which has led to a significant change in the antimicrobial susceptibility of organisms to antibiotics and the subsequent treatment options.

Aims: To isolate and identify the aerobes and anaerobes causing deep seated abscesses and to know the association of aerobes & anaerobes causing deep seated abscesses.

Setting and design: This was a Descriptive Hospital based cross-sectional study done in 50 abscess samples collected from patients admitted in our hospital in Pune city, India. (n=50)

Methods: All samples were collected from abscesses during incision and drainage with sterile needle and syringe after taking universal safety precaution and were subjected to the appropriate isolation techniques.

Statistical analysis: The data generated from study were subjected to simple descriptive statistical analysis using percentage.

Results: Out of the total samples that were collected (50), growth was seen in 78% (39) samples while 22%(11) samples did not show any growth. Maximum number of samples were obtained from breast and liver. Only Aerobic growth was seen in 79.48% (31) samples, No samples showed strictly anaerobic growth and Mixed (Aerobic + Anaerobic) growth was Seen in 20.52%(8) samples. E Coli and streptococcus were the most commonly found aerobes and Clostridium was the most common anaerobe.

Conclusion: Deep Abscesses are not visible to the patient and hence they are reported at a very late stage where the complications have already set in. The lack of proper measures taken has resulted in over usage of drugs and caused emergence of resistance to various drugs. A careful attempt should be made to identify the organisms along with proper culturing and treatment which will lead to a decrease in the morbidity and mortality.

KEYWORDS : aerobes, anaerobes, isolation, percentage

INTRODUCTION

Deep-seated abscess can occur at any sites like lung, brain, intra-abdominal, breast, retroperitoneal spaces etc. They are associated not only with significant morbidity but also mortality[1]. These abscesses are often difficult to access and hence neglected in many cases. Deep seated abscesses are often poly-microbial in nature involving both aerobic and anaerobic organisms [2]. Aerobic culture and sensitivity is commonly practiced to guide the treatment but no efforts are taken to look for the anaerobic infection in many cases. [3]. Most laboratories do not attempt to isolate or do the susceptibility testing of Anaerobes, as it is very tedious, costly and time consuming. The microbial pathogens, as well as, their antibiotic sensitivity pattern, may change from time to time and place-to- place and with the inadvertent use of antibiotics, the resistant pattern of these organisms has become unpredictable[4]. The literatures have reported 25-75% of aerobes and 20-35% of anaerobes as causative organisms from deep-seated abscesses. Mixed infections were reported from 6-35% of patients [2,5] . The predominant anaerobes isolated from different deep seated abscesses were Peptostreptococcus, Bacteriodes, Fusobacterium, Prevotella species.[2]The knowledge of the etiology and current drug resistance pattern of the common pathogenic bacteria causing deep-seated abscesses in a particular region is useful in treating patients in clinical practice.[6] Therefore the present study was conducted to know the bacteriology of deep seated abscesses with special reference to anaerobes to isolate, identify and treat the infection on time and prevent complications.

MATERIAL AND METHODS

Study Design: Descriptive Hospital based cross-sectional study.

Clinical settings: Study was done in a tertiary care hospital under the microbiology department in collaboration with the surgery department.

Duration of study: Two months (June and July 2016)

Selection of study group: Inclusion criteria: All outdoor & indoor patients with clinical diagnosis of deep seated abscesses were included in the present study.

Exclusion criteria: Patients with cutaneous and subcutaneous wound infections were excluded from the study.

Ethics: The study was carried out after obtaining ethical permission from the institutional ethics committee.

P**rocedure: Pus sample collection:** Pus sample for this study was obtained from deep-seated abscess region. Sample was collected from abscess during incision and drainage with sterile needle and syringe after taking universal safety precaution.

Pus sample was inoculated immediately in Robertson's cooked meat medium bottle (RCM) for anaerobic culture. Remaining sample was transferred in sterile test tube for aerobic culture.

For anaerobic isolation, sample in RCM bottle was incubated at 370C for 2 hrs. The sample from RCM medium was then inoculated on in house media like kanamycin BA, neomycin BA and Willis and Hobbs medium for isolation. The plates were then incubated under anaerobic condition in an anaerobic jar at 370C for 48 hrs. Anaerobic condition was checked simultaneously by doing subculture of *Pseudomonas aeruginosa* on BA as a control.The further identification of anerobes was done as per standard microbiological technique.[6]

For primary aerobic isolation, the sample was inoculated on Blood agar (BA) and MaConkey's agar (MA). These BA and MA was incubated at 370C for 18-24 hrs. Blood agar was incubated in presence of 5-10% CO_2. The isolated colonies were identified as per standard microbiological technique. Samples were then classified as Aerobic, Anaerobic or Mixed.

Statistical Analysis: The data generated from study were subjected to simple descriptive statistical analysis using percentage.

RESULTS

In this study of bacteriology of deep-seated abscesses, the following results were found:

Out of the total samples that were collected (50), 74% (37) samples were obtained from Male subjects and 26%(13) samples were collected from Female subjects. Out of these, growth was seen in 78% (39) samples while 22%(11) samples did not show any growth .From the collected samples (50), maximum number of samples 22%(11) were obtained from the breast and liver regions each , followed by the thigh region 16%(8) , 12%(6) samples were obtained from the scrotal region , 10% (5) from the psoas region, 8%(4) from the gluteal region followed by 2%(1) samples from each of the following regions that were lumbar ,back, pelvic, kidney, ischiorectal regions. Only for discussion purposes the following site-wise distribution has been used which is as follows: Breast- 22%(11) samples, Thigh- 16%(8) samples, Genital (Scrotal) – 12%(6) samples, Intra-Abdominal Region (liver, back , kidney, lumbar region, pelvic region) -30%(15) samples, Anal and perianal (gluteal, psoas, ischiorectal)- 20%(10) samples.

The growth patterns observed which were categorized as:

Aerobic: Only Aerobic growth was seen in 79.48%(31) samples.

Anaerobic: No samples showed strictly anaerobic growth.

Mixed (Aerobic + Anaerobic): Seen in 20.52%(8) samples In the Percentagewise Distribution of Aerobes , Out of the total samples that were collected, E.Coli was the organism that was found to be isolated in 23.33% samples followed by Streptococcus seen in 16.67% samples. 13.33% samples showed Actinobacter followed by MRSA , MSSA, Citrobacter which were isolated from 10% samples each. Pseudomonas and Enterobacter were found in 6.67% samples each followed by Klebsiella in 3.33% sample.

Of the total samples that showed growth (37), Anaerobes were found in 21.67% (8) samples. Out of the total anaerobic samples obtained, 25%(2) were from the thigh region followed by 12.5%(1) samples each from breast, Gluteal region,liver, back, Kidney, scrotal region.

Anaerobes isolated were Clostridium in 50%(4) samples, Peptostreptococcus in 37.5%(3) samples and Prevotella in 12.5%(1) sample.

DISCUSSION

Majority of the deep-seated abscesses in present study were obtained from the intraabdominal region accounting for 30% (15) of the total samples obtained in the present study which correlates with Pramodini et al[17] where 31% samples were from same region and also with the study conducted by Sreekanth Basireddy et al[2] where 28% of the total samples obtained were from the abdominal region. In a review study conducted by Brook et al [6] on deep abscesses, more than two thirds of the total abscesses are obtained from the abdominal region accounting 585(75%) out of total 778 samples Isolation of the organisms varies from site to site and also on the methodologies adopted during the study. A total of 50 samples from various deep-seated abscesses were obtained. Out of which 37 were culture positive with an isolation rate of 1.51 organisms per sample. This is similar to studies conducted by Pramodini et al [17] and Saini et al [19] where average numbers of organisms were 1.45 organisms per sample. In our study, aerobes were isolated in all 37 samples that showed growth followed by 8 out of 37(21.67%) anaerobes, similar to Pramodini et al[17] study where 17 out of 67 were anaerobes (25.4%). In contrast to present study Brook et al [6] study have recovered predominantly anaerobic organisms. In Brook et al [6] study, of liver and splenic abscess a total of 116 isolates were obtained out of which only 43 (37%) were aerobic and 73(63%) were anaerobes. Among aerobic organisms Ecoli was the most common organism isolated which is consistent with the study done by Sreekanth Basireddy et al [2] where the most common organism was E.coli (24%) followed by Streptococcus (present study) which is different from the study conducted by Sreekanth Basireddy et al[2] where Klebsiella (12%) was second most common. Among anaerobes, Peptostreptococci spp was the most common isolate in present study which correlates with study by Sreekanth Basireddy et al[2] where Peptostreptococci spp (41%)were found, followed by Clostridium species (37.5%) in our study which differs from Sreekanth Basireddy et al[2] where Bacteriodes spp constituted 23%. In the present study, MRSA accounted for 54.45% of the Staphylococcus aureus isolates which is similar to Sreekanth Basireddy et al[2] - 47% and Pramodini et al [22] where MRSA accounted for 33%.

CONCLUSION

Deep Abscesses are not visible to the patient and hence they are reported at a very late stage where the complications have already set in. The lack of proper measures taken has resulted in over usage of drugs and caused emergence of resistance to various drugs.. Without adequate therapy infection will persist. A careful attempt should be made to identify the organisms along with proper culturing and treatment which will lead to a decrease in the morbidity and mortality.

TABLES (Original Tables) and CHARTS (Original Charts)

Comparison of Present Study with Previously Done studies:

Table 1: Comparison of Present Study with Previously Done studies for Aerobes

	Itzhak brook et al (1997)	S. Pramodhini et al (2012)	Santosh Saini et al (2004)	Brook and Finegold et al (1977)	Itzhak brook et al (1999)	Basireddy et al(2014)	Present Study (2016)
Staphylococcus aureus	26	38	30	4	10	29	22
Enterococci	7					6	6
Streptococci		16	6	40	4	4	14
Escherichia coli	15	28	13	16	33	24	27
Klebsiella spp	2	20	9	16	5	12	6
Proteus spp	9	18	4	8	3	4	
Citrobacter spp	-	-	-	-	10	4	9
Pseudomonas spp	3	-	11	8	3	9	5
Actinobacter	-	-	-	-	-	-	11

***(All data in %)**[2,9,17,19,20,21]

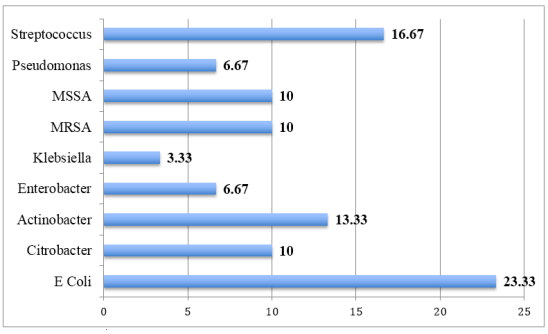
Table 2: Comparison of Present Study with Previously Done studies for Anaerobes

	Itzhak brook et al (1997)	Pramodhini et al (2012)	Santosh Saini et al (2004)	Brook and Finegold et al (1977)	Itzhak brook et al (1999)	Basireddy et al(2014)	Present Study (2016)
Peptostreptococci	35%	41%	60%	29%	27%	41%	38%
Clostridium spp	10%	-	-	12%	12%	9%	50%
Bacteriodes spp.	16%	59%	-	26%	33%	23%	-
Fusobacterium spp	10%	-	20%	6%	6%	18%	-
Prevotella spp	10%	-		18%	7%	9%	12%

***(All data in %)**[2,9,17,19,20,21]

Chart 1: Percentagewise distribution of Aerobes in the abscess

samples.



***(All data in %)**

REFERENCES

1. Koneman EW, Allen SD, Janda WM, Winn WC, Procop G, Schreckenberger P, et al (Eds). The role of microbiology laboratory in the diagnosis of infectious diseases: Guidelines to practice & management. In Colour Atlas and Textbook of Diagnostic Microbiology. VI Edn. Lippincott, Philadelphia. 2006: 2-61
2. Sreekanth Basireddy, Ribekha Zachariah, Manisha Singh, Vasanti Kabra. BACTERIOLOGICAL PROFILE OF BOTH AEROBIC AND ANAEROBIC ORGANISMS FROM DEEP SEATED ABSCESS/Journal Of Evolution Of Medical and Dental Sciences/2015/July/volume 4/issue57/P 9889-9896
3. Trevor Willis./ Anaerobic Bacteriology: Clinical and Laboratory Practice/page nos :147-150
4. UK Standards for Microbiology Investigations /Investigation of Abscesses and Deep-Seated Wound Infections/Issued by the Standards Unit, Microbiology Services, PHE Bacteriology | B 14 | Issue no: 5.2 | Issue date: 15.05.14 | Page: 1 of 33
5. Brogden KA, Guthmiller JM. Chapter9/Abscesses/ Polymicrobial Diseases /Washington (DC): ASM Press ; 2002/Pages 1 to 38
6. Itzhak Brook, MD, MSc; Edith H. Frazier, MSc/ Aerobic and Anaerobic Bacteriology of Wounds and Cutaneous Abscesses/ JAMA Surgery/November 1, 1990, Vol 125, No. 11
7. Brook I1/ Aerobic and anaerobic microbiology of intra-abdominal abscesses in children/ South Med J/1989 Dec/82(12)/P-1479-82.
8. National Committee for Clinical Laboratory Standards. Methods for antimicrobial susceptibility testing of anaerobic bacteria; approved standards.Ed6. Villanova, PA: NCCLS, 2004.
9. Brook I1, Frazier EH/ Microbiology of liver and spleen abscesses/ J Med Microbiol/1998 Dec/47(12):1075-80
10. Lee YQ1, Kanagalingam J./ Bacteriology of deep neck abscesses: a retrospective review of 96 consecutive cases./ Singapore Med J/ 2011 May/;52(5)/P-351-5.
11. Al Benwan K1, Al Mulla A, Rotimi VO/ A study of the microbiology of breast abscess in a teaching hospital in Kuwait/Med Princ Pract. 2011;20(5):422-6.
12. Lee SC1, Huang SS, Lee CW, Fung CP, Lee N, Shieh WB, Siu LK/ Comparative antimicrobial susceptibility of aerobic and facultative bacteria from community-acquired bacteremia to ertapenem in Taiwan./ BMC Infect Dis/2007 Jul 17/7:79.
13. Umibe A, Anazawa U, Kessoku H, Takaishi S, Hachisu T, Masuda A, Yoshimura T, Iino T, Tanaka Y./ Clinical Analyses of 115 Patients with Peritonsillar Abscess/ Nihon Jibiinkoka Gakkai Kaiho. 2015 Oct;118(10):1220-
14. Kamble, Pol , Jose, Gore ,Kagal ,Bharadwaj /The prevalance of anaerobes from cutaneous and subcutanueous wound infections/Indian Journal of Basic and Applied Medical Research; September 2014: Vol.-3, Issue- 4, P. 371-378
15. RaviChitra KN, Alluri Sitarama Raju , Hema Prakash, U Srinivas Rao, S Subbarayudu/A study of aerobic pyogenic isolates from wounds and abscesses and their antibiograms/ Medica Innovatica/June 2014/Volume 3 - Issue 1
16. Brito TP1, Hazboun IM2, Fernandes FL2, Bento LR2, Zappelini CE2, Chone CT2, Crespo An2./ Deep neck abscesses: Study of 101 cases/Published by Elsevier Editora Ltda
17. Pramodhini S, Thenmozhivalli PR, Selvi R, Dillirani V, Vasumathi A, Agatha D. Bacteriological profile of superficial and deep seated abscesses and their antibiogram in a tertiary care hospital, South India. Indian Journal of Medical Microbiololgy. June 2012, 123-129.
18. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing: Twenty-third Informational Supplment M100-S23. 2013; 72-86.
19. Saini S, Gupta N; Aparna, Lokveer, Griwan M.S. Surgical Infection: A Microbiological study.Brazilian Journal of Infectious diseases. 2004; 8(2)118-125.
20. Brook I, Frazier E H. Aerobic and anaerobic bacteriology of perirectal abscesses. Journal of Clinical Microbiology/1997/ 35/ 2974–2997.
21. Brook I, FinegoldS Mand Cherry J D/ Bacteriology of aspiration pneumonia in children/ Pediatric Research. 1977; 11: 568-5.