

# BACTERIOLOGY OF SEPTIC ABORTION WITH PARTICULAR REFERENCE TO ANAEROBIC BACTERIA

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## SUMMARY

Two hundred cases of septic abortion were investigated for their bacteriological spectrum and antimicrobial susceptibility. In 20 (10%) only anaerobes were isolated while mixed infection yielding both anaerobes and aerobes were encountered in 75 (37.5%) and only aerobes in 105 (52.5%). Amongst the anaerobes, anaerobic cocci were predominant (65.6%) followed by *Bacterioides* 25.5% and different *Clostridium* species 8.7%. Of aerobes, *Escherichia coli* 50% and *Staphylococcus pyogenes* 29.2% were predominant. Metronidazole provided to be the most effective (90%) drug against anaerobes and gentamicin against aerobes (90%).

### Introduction

Septic abortion remains a major cause of obstetric morbidity and mortality in spite of the advent of antibiotics and chemotherapeutic agents (Hill and Ayres, 1985). Both aerobic and anaerobic organisms are involved and the nature is usually polymicrobial (Thadepalli and Gorbach, 1973). There have been different claims regarding the isolation of predominant anaerobes like *Bacteroides* (Fearson and Anderson, 1970) or anaerobic cocci (Swenson, 1973) but the major concern is their resistance to most of the routine antibiotics. This study was therefore conducted to find out the bacteriology of septic abortion with particular reference to anaerobic bacteria and their antimicrobial susceptibility.

### Material and Methods

A total of two hundred specimens (Pus/Exudate/tissue) were collected in sterile containers from cases of septic abortion attending the Gynec. & Obstetric Hospital attached to Govt. Medical College, Amritsar. These specimens were first subjected to macroscopic examination for colour, odour and fluorescence. Microscopic examination was done after staining Kopeloff's modification of Gram's staining (Kopeloff, 1922). Specimens were inoculated on blood and MacConkey's agar plates and in Nutrient broth for aerobic organisms and on Neomycin blood agar, blood agar with antibiotic discs of penicillin (2 units/disc.), Gentamicin (10 ug/disc) and metronidazole (5 ug/disc) and Robertsons cooked meat medium for anaerobic culture. For anaerobes, incubation was done in anaerobic jar for 48 hours at 37°C. Organisms were identified by their morphological, cultu-

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ral and biochemical characters (Cruickshank, 1969; Gupta, 1982). Antibiotic susceptibility of both aerobes and anaerobes was tested by disc diffusion technique (Sutter, 1977).

### Results

The bacteriological findings are summarised in Table I. Anaerobic bacteria were isolated in 95 (47.5%) of two hundred specimens studied. In 20 (10%) these organisms were present in pure form and in 75 (37.5%) in combination with aerobes. Aerobes alone were isolated from 105 (52.5 per cent) patients. Total number of organisms isolated were 517 (380 aerobes and 137 anaerobes). Monomicrobial aetiology was observed in 43 (8 anaerobes and 35 aerobes) and polymicrobial in 157.

Table II shows that out of 137 anaerobes isolated 90 (65.69%) were gram positive cocci (Peptococci 63, peptostreptococci 27), 35 (25.54%) were bacterioides (*B. melaninogenicus* 14, *B. fragilis* 17 and *B. species* 4) and 12 (8.7%) were clostridia. *Peptostreptococcus magnus* was the commonest anaerobe present in

combination with aerobes (*Escherichia coli*). Out of 380 aerobes isolated *Escherichia coli* was predominant (50%) followed by *Staphylococcus pyogenes* 29.2%, *Klebsiella-Enterobacter* and *Pseudomonas aeruginosa* 7.6% each, *Proteus species* 2.9% and beta hemolytic streptococci 2.6%.

The antimicrobial susceptibility pattern of anaerobic isolates is presented in Table III. Metronidazole and chloramphenicol sensitivity was between 90 to 100 per cent. All the strains of *Bacteroides fragilis* were resistant to penicillin. Ampicillin sensitivity ranged between 52.9 to 100%. Tetracycline was also found to be a good drug except against clostridia (50%) and *Bacteroides fragilis* (0%). Amongst aerobes maximum number of isolates were sensitive to Gentamicin (90%) followed by cephalosporin (70%), chloramphenicol (68%), ampicillin (30%) and tetracyclines (27%).

### Discussion

A review of different reports on septic abortion indicates isolation of anaerobes

TABLE I  
Bacteriological Spectrum in Septic Abortion

Organism	Total No. of Positive cultures	Total No. of organisms isolated	Type of Organism	
			Aerobe	Anaerobe
1. Anaerobes only	20	32	—	32
Monomicrobial	8	8		
Polymicrobial	12	24		
2. Aerobes only	105	185	185	—
Monomicrobials	35	35		
Polymicrobial	70	150		
3. Mixed (Combination of Aerobes & Anaerobes)	75	300	195	105
Total	200	517	380	137

TABLE II  
Number and Percentage of Various Anaerobes and Aerobes Isolated from 200 Specimens

Anaerobes (137)		Aerobes (380)	
Organism	No. of isolates and percentage	Organism	No. of isolates and percentage
<i>Gram Positive Cocci</i>	90 (65.69%)	<i>Gram Positive Cocci</i>	121 (31.84%)
1. Peptococci	63 (45.98%)	Staph. pyogenes	111 (29.21%)
P. niger	10 ( 7.29%)	Beta hemolytic streptococci	10 ( 2.63%)
P. prevoti	4 ( 2.91%)	<i>Gram Negative Bacilli</i>	259 (68.16%)
P. species	49 (35.76%)	Each coli	190 (50%)
2. Peptostreptococci	27 (19.70%)	Klebsiella Enterobacter	29 ( 7.63%)
P. magnus	12 ( 8.75%)	Pseudomonas aeruginosa	29 ( 7.63%)
P. anaerobius	10 ( 7.29%)	Protens sp.	11 ( 2.9%)
P. intermedius	4 ( 2.91%)		
P. species	1 ( 0.72%)		
<i>Gram Negative Rods</i>			
Bacteroides	35 (25.54%)		
B. fragilis	17 (12.40%)		
B. melaninogenicus	14 (10.21%)		
B. species	4 ( 2.91%)		
<i>Clostridia Group</i>	12 ( 8.75%)		
Cl. perfringens	3 ( 2.1%)		
Cl. pseudotetanicum	4 ( 2.9%)		
Cl. sporogenes	4 ( 2.9%)		
Cl. bifermentans	1 ( 0.7%)		

from 0.5 per cent to 100 per cent (Thadepalli *et al*, 1973; Finegold, 1977 and Chatterjee and Chakravarty, 1987). Scottmueller (Cited by Finegold, 1977) reported 36.6%, Chatterjee and Chakravarty (1987) 40.3% and Ayyagari *et al* (1987) 57%. In the present study it was 47.5%. This reflects the varied effectiveness of the transport systems and culture techniques used for anaerobic isolation.

Gram positive cocci were the commonest anaerobes isolated (65.6%) and peptostreptococcus magnus was the most common species (8.7%). Moberg and Nord (1982) and Finegold (1977) also described anaerobic streptococci as a major group in septic abortion. Total isolation of Bacteroides reported in septic abortion varies from 9.6% to 21% (Ledger *et al* 1971; Ayyagari *et*

*al*, 1987 and Chatterjee and Chakravarty, 1987). In the present series it was 25.5% with Bacteroides fragilis as principal species (12.4%). This is an important finding because these strains were found to be resistant to penicillin. Ledger *et al* (1971) claimed the significance of bacteroides species in terms of severity of infection produced by them. Total isolation of clostridia was 8.7% and clostridium perfringens accounted for only three infections (2.1%). Isolation of clostridium sporogenes and clostridium pseudotetanicum, 2.9% each, of our series have not been recorded by others (Gupta, 1978 and Chatterjee and Chakravarty, 1987). The overall difference may be attributed to racial and geographical variations.

The isolation of Escherichia coli by Thadepalli (1973) and Chatterjee and

TABLE III  
Antimicrobial Susceptibility of Anaerobes Isolated from the Cases of Septic Abortion (Susceptibility Expressed in Percentage)

Organisms	Number	Antibiotic/disc.				
		Ampicillin 15 ugm	Chloramphenicol 30 ugm	Metronidazol 5 ugm	Penicillin 10 ugm	Tetracyclin. 30 ugm
Gram Positive cocci	90	90	90	90	90	90
Gram negative Bacilli (Bacteroides)	35					
B. fragilis	17	52.9	100	100	0	0
B. melaminogenicus	14	100	100	100	92	100
B. Species	4	100	100	100	75	100
Clostridia group	12					
Cl. perfringens	2	100	100	100	100	50
Cl. species	10	80	90	100	96	50

Chakravarty (1987), Staphylococcus and Streptococcus by Ayyagari *et al* (1987) and Chatterjee and Chakravarty (1987) and beta haemolytic streptococci by Harris (Cited by Finegold, 1977) from septic abortion corroborates our data of aerobic isolates. It was observed that anaerobes were isolated more frequently in association with aerobes (37.5%). The reason for this association may be the symbiotic and synergistic effect of aerobes which lower the oxidative reduction potential which in turn is essential for the growth of anaerobes (Chow *et al*, 1977).

Antibiotic sensitivity tests showed that metronidazole was the most effective drug against bacteroides and clostridia (100%). 90% anaerobic cocci were also found to be sensitive to it. However recently instances of development of resistance to metronidazole have been reported (Ayyagari *et al*, 1987). Chow *et al* (1977) observed that only 74% anaerobic cocci, 85% bacteriodes and 87% clostridia were sensitive to metronidazole. *B. fragilis* was found to be resistant to penicillin and tetracyclines as noticed by Bodner and Koeming (1976). Getamicin proved to be the most effective drug (90%) against the aerobic organisms. Aggarwal (1974) had also observed 93% to 95% susceptibility to this drug. Septic abortions should therefore be treated with appropriate antibiotics that suppress both aerobic and anaerobic elements to avoid serious complications.

#### References

1. Aggarwal, K. C.: Ind. J. Path. and Bact. 17: 149, 1974.
2. Ayyagari, A., Chakraborti, A. and Aggarwal, K. C.: Ind. J. Med. Microbiol. 5: 189, 1987.

3. Bodner, S. J., Koenig, M. G.: *Ann. Int. Med.* 73: 537, 1976.
4. Chatterjee, B. D. and Chakraborti, C. K.: *Ind. J. Med. Microbiol.* 5: 185, 1987.
5. Chow, A. W., Bednon, D. and Gurel, L. B.: *Proceedings of International Metronidazole Conference, Montreal, May, 1977, p. 286*
6. Cruickshank, R.: *Medical Microbiology, 11th Ed. 1969, Page 896, ELS Livingstone, Edinburg.*
7. Finegold, S. H.: *Anaerobic bact. in human disease, 1977, Page 350. Academic press, New York*
8. Gupta, U.: *The Ind. Pract.* 31: 271, 1978.
9. Gupta, U.: *Anaerobic bacteriology Laboratory Manual, 1982, Deptt. Microbiol A. I. I. M. S., New Delhi.*
10. Hill Gale, B. and Ayres Onida, M.: *Anti-microbial agents and chemotherapy.* 27: 324, 1985.
11. Kopeloff, N. and Beerman, P.: *Modified Gram stains. J. Inf. Dis.* 31: 480, 1922.
12. Ledger, W. J., Sweet, R. L. and Headington, J. T.: *Surg. Gynaecol. Obstet.* 133: 837, 1971.
13. Moberg, P. L. and Nord, C.: *European, J. Clin. Microbiol.* 1: 82, 1982.
14. Pearson, H. E. and Anderson, G. V.: *Am. J. Obstet. and Gynaecol.* 107: 1264, 1970.
15. Sutter, V. L.: *J. Inf. Dis.* 57: 185, 1977
16. Swenson, R. M.: *Obstet. and Gynaec.* 42: 538, 1973.
17. Thadepalli, H. and Gorbach, S. L.: *Amer. J. Obstet. and Gynaec.* 117: 1034 1973.