CIDEX 2% AS A CHEMICAL STERILIZING AGENT FOR PLASTIC SUCTION CANNULA*

by

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Aqueous glutaraldehyde 2% solution becomes antimicrobially active only when it is buffered by alkalinising agent to pH 7.5-8.1 and the activation of the antimicrobial activity is maintained for at least two weeks (Stonehill *et al*, 1963).

The suction evacuation cannula used for first trimester termination of pregnancy is an instrument which comes in direct contact with the site of operation i.e. decidua and should be graded as a "critical item" in contrast to other medical equipments used such as gastroscope which is graded as semi critical item (Spaulding, 1970).

Plastic Karman's cannula may be presterilized and disposed off but it is common practice to use it repeatedly after chemical sterilization. Sterilization with ethylene dioxide though method of choice is not yet easily available. Twenty minutes immersion in Cidex 2+ renders the instrument gram free (Spence *et al*, 1978). It is also found to have high degree of sporicidal activity. Savlon (active constituents: Chlorohexidine gluconate solution B.P. 7.5% V/V) used frequently at present is found to have no sporicidal activity (Spaullding, 1970; Bergan and Lystad, 1970).

In the present study efficacy of cidex 2% is evaluated for cold sterilization of the plastic suction cannulae.

Materials and Methods

Fifty new plastic Karman's cannulae were numbered with the help of glass marking pencil and used for 210 cases of first trimester termination of pregnancy in otherwise healthy Coherts.

Each cannula was immersed overnight in Cidex 2% in CX Tray—10 system; sterility of the solution was checked in thioglycollate broth by taking out one cannula of each batch at random.

Cannulae were used for the first time in 50 cases, in 2nd and 3rd in 50 cases, for 4th to 8th time in 50 cases, 9th to 13th time in 47 cases and 14th to 16th time in 13 cases.

For the purposes of evaluation of efficacy of Cidex 2% all 210 cannulae were washed in 10 cc of sterile saline after use and the washings obtained labelled as Rinse I. Seventy Rinse IIa, IIb and IIc were obtained after immersion of

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cannulae in Cidex 2% for 2, 3 and 4 hours respectively (Table I).

All rinses were cultured on blood agar, Mac Conkey agar and thioglycollate broth. Agar plates were incubated overnight at 37°C. The growth obtained was identified as per Cruickshank, 1975. Thioglycollate broth was incubated at 37°C and observed for the presence of turbidity for 7 days (Stuart and Bleoain, 1968). The quantitative count of the rinses was done by incubating a loopful of each on Blood agar and Mac Conkey agar media.

Observations

Exposure to Cidex 2% (pH 7.5-8.2) for four hours is found to be effective as sterilizing method (Table II).

After exposure for 2 hours Rinse IIa had grown pathogenic microbes still in 11.42%. However, nonpathogenic microbes were killed as seen from reduction in positive cultures from 11.90% in Rinse I to 2.85% in Rinse IIa (Table I).

The immersion in Cidex 2% for 3 hours

TABLE I

Bacteriological Study of Rinse-I Rinse IIa, Rinse IIb and Rince IIc

Rinse examined	Total No. of cases	Bacteriological study of culture		
		No growth	Pathogenic	Nonpathogenic
Rinse I				
No.	210	165	20	25
%		78.57	9 52	11.90
Rinse IIa				
No.	70	60	8	2
%		85.71	11.42	2.85
Rinse IIb				
No.	70	67	3	—
%		95.71	4.28	—
Rinse IIc				
No.	70	70	—	—
%		100.0	—	—

TABLE II

Bacteriological Study of Rinses I, IIa, IIb and IIc on Blood Age & MacConkey Agar Media

Bacteriological study of culture	Rinse I		Rinse IIa		Rinse IIb		Rinse IIc	
	No.	%	No.	%	No.	%	No.	%
No growth	165	78.57	60	85.71	67	95.71	70	100
Pathogenic positive	20	9.52	8	11.42	3	4.28	—	—
E. coli	11	5.23	4	5.71	3	4.28	—	—
Staph. pyogenes	6	2.85	2	2.85	—	—	—	—
Klebsiella	3	1.42	2	2.85	—	—	—	—
Non-pathogenic								
Positive	25	11.90	2	2.85	—	—	—	—
Aerobic	—	—	—	—	—	—	—	—
Spore bearing bacilli	14	6.66	2	2.85	—	—	—	—
Micrococci	7	3.33	—	—	—	—	—	—
Staph. albus	2	9.09	—	—	—	—	—	—
Diptheroids	2	9.09	—	—	—	—	—	—

had virtually caused complete disappearance of the non-pathogenic flora but pathogenic organisms were still grown in 4.28% of Rinse IIb. The complete sterility of the cannullae required minimum of 4 hours immersion in Cidex (Table I). Table III reveals that after the immersion in cidex 2% for 2 hours, the relative frequency of the different types of microorganisms grown is same as in Rinse I, obtained soon after use. The exposure for 3 hours had grown only E. coli pathogens which too were killed by 4 hours exposure.

Bacteriological studies were also carried out to find out effect of repeat use of the cannulae. The washings obtained from 50 new cannulae immediately after use did not reveal any positive cultures in Rinse I (Table III). This shows that longer duration of exposure to chemical sterilizing solution is required for the repeat use of the cannulae. The cultures obtained in Rinse IIb (exposure to Cidex 2% for 3 hours) from the cannulae used for more than five times were positive but the quantitative colony count was less than 100 microbes/ml (Table IV).

Discussion

Chemical 'cold' sterilization is widely used for plastic medical equipments as they cannot be boiled or autoclaved. The implantation site provides a high receptive entry site for the microbes and hence suction cannula must be completely germ free. Most of the germicides are used in the form of aqueous solutions. The water present in such solutions brings the chemical agent and microbes together and constitutes the "water of reaction" without which the disinfection stops. Various liquid germicides include formaldehyde, alcohol, phenolic compounds, chlorine compounds, idophores, Savlon and glutaraldehyde (Block, 1977).

Buffered glutaraldehyde is a saturated

TABLE III

Percentage of Positive Cultures Obtained From Rinse I, IIa, IIb and IIc With Repeated Use of Cannulae

Rinse studied	Number of cultures					
	1st use	2nd use	3rd to 5th use	6th to 8th use	9th to 11th use	>12
Rinse I						
N = 210	50	30	30	30	30	30
No.	—	8	14	8	6	9
%	—	26.66	46.66	26.66	20.0	30.0
Rinse IIa						
N = 70	20	10	10	10	10	10
No.	—	1	3	2	1	3
%	—	10	30	20	10	30
Rinse IIb						
N = 70	15	15	15	10	10	5
No.	—	—	—	1	1	1
%	—	—	—	10	10	10
Rinse IIc						
N = 70	15	10	15	10	10	10
No.	—	—	—	—	—	—
%	—	—	—	—	—	—

TABLE IV

Quantitative Colony Count of Pathogenic Positive Cultures Obtained From Rinse I, Rinse IIa and Rinse IIb

Pathogenic positive	Total No of cases	More than 10,000 microbes/ml		100-10,000 microbes/ml		<100 microbes/ml	
		No.	%	No.	%	No.	%
Rinse I							
E. coli	11	—	—	6	54.55	5	45.45
Klebsiella	3	1	33.33	1	33.33	1	33.33
Staph. pyogenes	6	3	50.00	1	16.66	2	33.33
Rinse IIa							
E. coli	4	—	—	3	75.00	1	25.00
Klebsiella	2	—	—	—	—	2	100.00
Staph. pyogenes	2	—	—	—	—	2	100.00
Rinse IIb							
E. coli	2	—	—	—	—	2	100.00
Klebsiella	2	—	—	—	—	2	100.00
Staph. pyogenes	1	—	—	—	—	1	100.00
Rince IIc	—	—	—	—	—	—	—

dialdehyde chemically related to formaldehyde but reported to be 2 to 8 times more sporicidal than formaldehyde (Block, 1977). It has been advocated widely for the anaesthetic and urological instruments (Stonehill *et al,* 1963). It kills all forms of microbial life and is not degraded or inhibited by biological material. It has no deleterious effects on medical equipments and produces rapid sterilization. Its interaction with the cell envelope (probably the lipoprotein or globular protein layer) of gram negative bacteria has been described by Munton and Russell (1974) but no study of its effect on Gram-positive bacteria appears to have been made. Rubbo and Webb (1967) have proposed that it interacts with amino and sulphuryl groups in bacterial spores. Sierra and Bouchor (1971) postulated that glutaraldehyde is very effective in inhibiting the germination process.

The most important time for disinfecting instruments is immediately prior to use (Noy and Lynne, 1977).

There was definite decrease in the percentage of positive cultures after immersion in cidex 2% for 2 hours. Two hours exposure was found to cause marked reduction in contamination of the cannulae as shown by decrease in non-pathogenic cultures from Rinse IIa (2.85%) as compared to Rinse I (11.90%) (Table II). Complete eradication of the non-pathogenic flora obtained after immersion for 3 hours but the complete sterilization of the cannulae could only be possible after exposure to the cidex 2% for 4 hours. In hospital practice it is not convenient to immerse cannulae for 4 hours due to morning operation timings, thereby overnight immersion in cidex 2% is advocated. Prior to use cannula should be washed in sterile water as cidex is reported to have local irritating effect on mucosa (Stonehill *et al,* 1963).

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