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A study on Bacteraemia Following Upper Gastrointestinal Endoscopy and Sclerotherapy

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Abstract

To determine the risk of bacteraemia following upper GI endoscopy, 93 patients were studied. Blood samples were collected for cultures just before, 5 minutes and one hour after the procedure. Cases were subjected to diagnostic upper GI endoscopy or sclerotherapy. The rate of bacteraemia was 15.1% which was significantly higher in cases subjected to sclerotherapy (29%) than in diagnostic GI endoscopy (8.1%). Higher rates of bacteraemia in patients with decompensated than compensated liver disease but the differences were statistically insignificant. Persistence of bacteraemia for one hour following sclerotherapy was found in decompensated liver disease only (2.15%). No clinical evidence of infection was detected in postprocedure follow-up. The organisms isolated from bacteraemic cases were *Strept. viridans* (5 strains), *Staph. epidermidis* (3 strains), *Diphtheroid* species (3 strains), *Staph. aureus* (one strain), *Strept. pyogenes* (2 strains). These organisms were derived from the oropharynx. No obligatory anaerobic organisms were isolated.

Introduction

GASTROINTESTINAL (GI) endoscopy allowed great progress in the diagnostic accuracy and in the management of various GI diseases.

GI endoscopy by necessity involves considerable manipulations and minor trauma to oropharyngeal and intestinal mucous

membrane [1]. Transient bacteraemia is known to occur with diagnostic and therapeutic procedures which involve manipulation of epithelial surfaces with endogenous bacterial flora [2].

Studies on bacteraemia following upper GI endoscopy reported results vary from 0% to 10% [3]. Higher rates were report-

ed following endoscopic sclerotherapy of oesophageal varices (OV). Nawar et al [4], reported 12%, while Botoman and Surawicz [5], reviewed some studies which reported rates of bacteraemia up to 31%.

Such bacteraemia is of no consequence in healthy subjects yet they are of importance in cardiac cases and in those who are immune-suppressed [6].

The aim of this work is to study bacteraemia following diagnostic upper GI endoscopy and sclerotherapy as regards its rate of development, its duration, the organisms involved and its relation to the state of liver affection and decompensation.

Materials and Methods

The subjects in this study were 93 patients attending Mataria Teaching Hospital. Their age ranged from 22 to 58 years old. They were of both sexes (72 males and 21 females).

All patients were subjected to full clinical examination and laboratory investigations as regards liver function tests.

None of them was febrile or received antibiotics for at least 15 days before the procedure.

Cases were categorized into two groups according to the procedure done:

Group I:

Cases subjected to diagnostic upper GI endoscopy (62 out of 93, 66.7% of total).

These cases were subdivided on the basis of clinical and laboratory investigations into :

Group Ia: Cases with no clinical or biochemical evidence of liver disease and the indication for endoscopy was to investigate dyspeptic symptoms or history of haematemesis (23 out of 62, 37.1%).

Group Ib: Cases showed palpable liver and spleen with no clinical or biochemical evidence of hepatic decompensation Child's A classification (Child, Turcotte [7]). The indication for endoscopy was to investigate dyspeptic symptoms and assessment of OV (16 out of 62, 25.8%).

Group Ic: Cases showed clinical and biochemical evidence of hepatic decompensation (Child's B and C classification). They were investigated for dyspeptic symptoms and assessment of OV (23 out of 62, 37.1%).

Group II

Cases with liver cirrhosis and portal hypertension (31 cases of 93, 33.3% of total). They have history of haematemesis from ruptured OV. They were subjected to elective sclerotherapy. Ethanolamine oleate was the sclerosant used, the amount injected in each case was 10-14 cc. in 5-7 sites and injection was mostly intravariceal (1.5-2.5 cc in each site).

Patients in this group were divided according to the state of hepatic compensation, on clinical and laboratory basis, into:

Group IIa: Cases with compensated liver

cirrhosis, Child's A classification. They were 9 out of 31 (29%).

Group IIb: Cases with decompensated liver (Child's B and C classification), 22 cases out of 31 (71%).

The instrument used was Olympus GIF XQ20. Sterilization of the endoscope and other equipment was done according to the manufacturers instruction. Meticulous physical cleaning of the instrument, then immersion in 2% aqueous alkaline glutaraldehyde for 10 minutes [8].

Bacteriological Study

Three blood samples were taken from each case for blood culture. The blood samples were taken just before the procedure, 5 minutes and one hour after the procedure. Duplicate blood cultures from each sample were done, incubated aerobically and anaerobically at 37°C. Subcultures were done every other day for 15 days. The isolated organisms were identified by

standard techniques as regards the morphology, cultural characters and biochemical reaction tests [9].

Patients were observed for two weeks after the procedure for the development of fever or evidence of infection.

Results

All patients were not bacteraemic before the procedure. Bacteraemia was detected in 14 cases out of 93 patients (15.1%) after the procedure. Peak bacteraemia was 5 minutes after endoscopy which was transient in 12 out of 14 cases (85.7%). Only 2 cases (2.15%) were positive blood culture in one hour samples after the procedure. The difference was highly significant (Table 1).

Clinical follow-up of these cases showed no evidence of infection or fever.

Comparing the rate of bacteraemia after diagnostic upper GI endoscopy (group I) and sclerotherapy (group II) 5 minutes af-

Table (1): Rate of Bacteraemia After Endoscopic Procedures.

Total No. of cases	Positive blood cultures					
	Before the procedure		After the procedure			
	No.	%	5 min		1 hour	
	No.	%	No.	%	No.	%
93	0	0	14	15.1	2	2.15

"t" test of proportion = 3.15, $p = 0.007$

ter the procedure showed that 5 out of 62 cases (8.1%) of group I, and 9 out of 31 cases (29%) of group II were bacteraemic with significant difference. Two cases in group II (6.45%) were bacteraemic in sam-

ples 5 minutes and one hour after the procedure (Table 2).

The relation between bacteraemia and the state of hepatic affection and decompensation is shown in table (3). No bacte-

Table (2): Rate of Bacteraemia Group I and II.

Groups	No.	Positive blood cultures			
		5 min.		one hour	
		No.	%	No.	%
I	62	5	8.1	0	0
II	31	9	29.0	2	6.45
Total	93	14	15.1	2	2.15

"t" test between group I and II, 5 min after the procedure = 2.24,

"t" test between group I I = 3.1, $p = 0.001$ $p < 0.05$

raemia developed in group Ia, while 2 cases in group Ib (12.5%) and 3 cases in group Ic (13.5%) were bacteraemic 5 minutes after the procedure, however, this difference was statistically insignificant.

None of group I cases was bacteraemic in samples taken one hour after the procedure.

Bacteraemia in group II was detected 5 minutes after the procedure, 2 cases

Table (3): Bacteraemia Following Diagnostic GI Endoscopy in Relation to Hepatic Affection Group I and II.

Groups	No.	Positive blood cultures			
		5 min		one hour	
		No.	%	No.	%
Ia	23	0	0	0	0
II	16	2	12.5	0	0
IC	23	3	13.5	0	0

"t" test between Ib and Ic = 1.07, $p = 0.143$

(22.2%) in group IIa and 7 cases (31.8%) in group IIb, however, the difference was statistically insignificant.

Blood cultures one hour after the procedure were negative in group IIa and positive in 2 cases (9%) of group IIb (Table 4).

Table (3): Bacteraemia Following Sclerotherapy in Relation to Hepatic Compensation.

Groups	No.	Positive blood cultures			
		5 min		one hour	
		No.	%	No.	%
Ia	9	2	22.2	0	0
IIb	22	7	31.8	2	9
Total	31	9	29.0	2	6.45

χ^2 between group IIa and IIb = 0.543, $p = 0.461$

"t" test for IIb group IIb = 1.78, $p = 0.037$

As regards the isolated organisms from positive blood cultures, no anaerobic organisms were isolated. *Strept. viridans* was the most frequently isolated organism (35.71%). Other bacterial species were *Diphtheroids* (21.42%), *Staph. epidermidis* (21.48%), *Strept. pyogenes* (14.28%), and *Staphy. aureus* (7.14%). However, the relative frequency of isolation of *Strept. viridans* was not significantly different from *Staph. epidermidis*, *Diphtheroids*, and *Strept. pyogenes* (Table 5).

The two cases in whom bacteraemia persisted for one hour, the organism isolated was the same as in the corresponding blood culture 5 minutes after the proce-

Table (4): Isolated Organisms From Positive Blood Cultures

Bacterial Species	No. of Strains	%
<i>Strept viridans</i>	5	35.71
<i>Staph. epidermidis</i>	3	21.42
<i>Diphtheroids</i>	3	21.42
<i>Strep. pyogenes</i>	2	14.28
<i>Staph. aureus</i>	1	
Total	14	7.14

"t" test between *Strept viridans* and *Staph. epidermidis* = 1.24, $p = 0.01077$

"t" test between *Strept viridans* and *Staph. aureus* = 1.82, $p = 0.0348$

"t" test between *Strept viridans* and *Strept pyogenes* = 1.19, $p = 0.177$

dure. These organisms were *Strept. viridans* and *Staph. epidermidis*.

Discussion

The rate of bacteraemia after diagnostic upper GI endoscopy was 8.1%. This bacteraemia was detected in blood samples taken 5 minutes after the procedure while samples taken after one hour were negative, this indicated the transient nature of this bacteraemia.

Shorvon et al [3]. reviewed 10 studies and reported rates varied from 0-10% during 30 minutes after endoscopy procedure.

Botoman and Surawicz [5], in reviewing some studies reported 4.1% rate with peak bacteraemia during and 5 minutes after the procedure. However, interpretation of the data was complicated by differences in the selected patients studied, time of taking blood samples and the culture techniques done.

Cases which had no evidence of hepatic disease (group Ia) were not bacteraemic compared to hepatosplenic cases, compensated (group Ib) and decompensated (group Ic) which were bacteraemic in a rate of 12.5% and 13.5% respectively, however, the difference was insignificant.

Significant higher rate of bacteraemia was found in cases subjected to sclerotherapy in samples taken 5 minutes after the procedure (29%) than in cases subjected to diagnostic upper GI endoscopy (8.1%). This could be explained by the trauma of

the injector to the varices and oesophageal mucous membrane which open the way to microorganisms into the blood. Dilatation of oesophageal stricture is another procedure which is associated with trauma of oesophageal mucous membrane and high rate of bacteraemia [10,11].

On the other hand, cases with chronic liver disease and portal hypertension have extensive intrahepatic and extrahepatic portosystemic shunts which interfere with the liver ability to clear the invading organism and increased the incidence of bacteraemia in cirrhotic patients [12]. Moreover, defective reticuloendothelial phagocytic activity and impaired neutrophil function in liver cirrhosis were reported by Rimola et al. [13], Rajkovic and Williams [14], and Babior [15]. This could also explain the higher frequency of bacteraemia in cases subjected to sclerotherapy in decompensated liver cirrhosis and the longer persistence of bacteraemia for one hour in two cases of this group.

Regarding the organisms involved in bacteraemia mainly *Streptococcus*, *Staphylococcus*, and *Diphtheroids* species are usually normal commensals in the oropharynx and carried by the endoscope during its introduction and this was previously reported by O'Connor et al [1].

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