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Original Research Article

Correlation of prolonged fasting and gall bladder sludge formation after emergency G. I. surgery

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ABSTRACT

Background: After emergency laparotomy due to some intestinal pathology patient are kept fasting to rest the bowel so that repaired pathology could get the proper time for healing. And during this period body's nutritional requirement are replenished either by total parenteral nutrition or other intravenous fluids containing glucose and electrolytes. The major complication of TPN is liver disease that most commonly include steatosis, cholestasis, Cholelithiasis. Development of cholestasis, biliary sludge, and gall stone are due to loss of enteric stimulation and not directly linked to TPN. The effect of fasting on the composition of hepatic and gall bladder bile in humans has already been studied and this shows gall bladder bile is significantly supersaturated after fasting and can lead to sludge formation.
Methods: A prospective study was conducted in department of general surgery, a rural tertiary care centre in north india (UPUMS, Saifai, Etawah, Uttar Pradesh, India) between January 2016 to May 2017. Study included all the patients in emergency who were planned for emergency laparotomy based on inclusion and exclusion criteria.
Results: Of the 116 patients 83 (71.5%) were male patients and 33 (28.4%) were female patients, aged between (23 - 64 years). Total no. of sludge positive patients after 7 days was 39 (33.6%). Sludge positive female patients were 17 in 33 (51.1%) and sludge positive male patients were 22 out of 83 male patients (26.5%). Out of 53 patients of duodenal and gastric surgery 28 patients (52.8%) developed sludge formation. Out of other 63 surgeries only 10 (15.8%) patients developed sludge. Out of 39 sludge positive patients 28 (71.7%) were alone from group of duodenal and gastric surgery.
Conclusions: our study supports that the prolonged restriction of oral food intake in patient operated on the gastrointestinal tract that results in decreased contractility due to absence of food stimulated gall bladder contraction, may be an important cause to sludge development in our group of patients.

Keywords: Emergency laparotomy, Fasting, Gallbladder sludge, TPN

INTRODUCTION

After emergency laparotomy due to some intestinal pathology patient are kept fasting to rest the bowel so that repaired pathology could get the proper time for healing. And during this period body's nutritional requirement are replenished either by total parenteral nutrition or other intravenous fluids containing glucose and electrolytes.[1] Although TPN is life saving for patients on prolonged fasting after emergency laparotomy, one of the major complication of TPN is liver disease that most commonly include steatosis, cholestasis, cholelithiasis and these entities have been directly linked to TPN.[2] There is high incidence of gall stone disease in patients on long term TPN. Presence of gall bladder sludge is directly correlates to duration of TPN.[3] That eventually results in

cholelithiasis.[3] Development of cholestasis, biliary sludge, and gall stone are due to loss of enteric stimulation and not directly linked to TPN.[4] This increased risk of gall bladder disease in these patients is due to bowel rest and gall bladder stasis. The effect of fasting on the composition of hepatic and gall bladder bile in humans has already been studied and this shows gall bladder bile is significantly supersaturated after 15 hours but cholesterol saturation falls after 20 hours.[5,6] keeping this in mind we planned a study in our rural tertiary centre using serial USG in patient undergoing emergency gastrointestinal surgery and subsequent fasting without TPN for assessment of incidence of gall bladder sludge formation. Our study questions whether there is correlation in the prolonged fasting and gall bladder sludge formation in patients not having TPN, condition clinically similar to TPN as there is no oral intake but intravenous fluids given are different from TPN.

METHODS

A prospective study was conducted in department of general surgery, a rural tertiary care centre in north india (UPUMS, Saifai, Etawah, Uttar Pradesh, India) between January 2016 to May 2017. Study included all the patients in emergency who were planned for emergency laparotomy based on inclusion and exclusion criteria.

Inclusion criteria

All patients of age >15 and <70 planned emergency laparotomy with absence of known gall stone disease and normal liver function tests.

Exclusion criteria

Known diabetic, known hypothyroidism, and patients with abnormal cholesterol or triglyceride level were excluded. Pancreatic or liver injury patients were also excluding from the study.

Immediate bed side USG was done in emergency to assess the gall bladder. USG was performed by trained ultra-sonologist using real time scanner with 3.5 mhz convex array transducer. Diagnosis of sludge was made when hyperechogenic bile showed no acoustic shadowing.[15]

Patients were operated according to pathology and kept nil per oral for atleast 7days extendable upto 10 days if required. No patients were given opioid analgesics, anticholenergics, ceftriaxone. Ceftriaxone have been proved to be the cause of gall bladder sludge formation.[7] Preffered fluid given were 5% dextrose, 0.9% normal saline, isolyte M, and electrolytes to match daily requirement and losses. USG was repeated on 7th post-operative day and 10th postoperative day If fasting was extended. Whole data compiled and analysed statistically. Study used chi square test to analyse and compare the sludge formation between upper and lower g.i. surgery also between male and female patients.

RESULTS

143 patients were included in the study initially but out of these 143 patients 27 patients were absconded, reoperated or died. so finally, 116 patients were included for statistical analysis. Of the 116 patients 83 (71.5%) were male patients and 33 (28.4%) were female patients, aged between (23 - 64 years).

Table 1: Distribution of patients in the study.

Total no of patient selected	143
Drop out from study	27
Patient included in study	116
Male	83
Female	33
Total no of sludge positive patients after 7 days	39 (33.6%)

Out of these 116 patients 53 patients were of gastric and duodenal perforations, 21 patients were operated for gastrointestinal injury due to blunt trauma, 27 ileal perforations, 9 right hemicolectomies, 4 left hemicolectomies and 2 hartmann's procedure.

Table 2: Final procedure done in patients.

Final procedure	Patients no.
Gastric or duodenal surgery	53
Blunt trauma	21
Ileal perforation surgery	27
Right hemicolectomy	9
Left hemicolectomy	4
Hartmann's procedure	2

Table 3: Relationship between the presence of sludge and sex of patients, and surgery.

Sludge positive	Sludge negative
Male -22 (26.5%)	61
Female -17 (51.1%)	16
Stomach and duodenal surgery 28 (52.8%)	25
Rest of the surgeries 10 (15.8%)	53

Total no. of sludge positive patients after 7 days was 39 (33.6%). Sludge positive female patients were 17 in 33 (51.1%) and sludge positive male patients were 22 out of 83 male patients (26.5%). Out of 53 patients of duodenal and gastric surgery 28 patients (52.8%) developed sludge formation. Out of other 63 surgeries only 10 (15.8%) patients developed sludge. Out of 39 sludge positive patients 28 (71.7%) were alone from group of duodenal and gastric surgery.

DISCUSSION

In this study shows significant relationship between fasting and sludge formation in patients of emergency laparotomy with gastrointestinal surgery.

Study done by Bolondi et al, the total no of sludge positive patients after 10 days of fasting was 12 out of 38 (31.6%) that showed significant relationship between gall bladder sludge formation and fasting after G.I. surgery.[8] That relationship is comparable to our study in which 39 (33.6%) out of 116 patients showed significant relationship. In this study sludge positive female patients were 17 in 33 (51.1%) and sludge positive male patients were 22 out of 83 male patients (26.5%). That is significant difference. But this difference was not significant in study done by Bolondi et al.[8] The possible explanation may be some other physiological factor.

In another study done by Messing et al, which was done with TPN.[9] in this study they found incidence of sludge formation was infrequent during first 3 weeks of TPN. But when TPN was given for over six weeks it was frequent and constant. In study done by Messing et al USG done on 10 days did not showed sludge formation. But in our study sludge formation was in 33.6 % patient in first 10 days which was significantly lower in study of Messing et al. the possible explanation may be by some unknown factor other than decreased contractility of gall bladder after fasting. It is believed that important cause for sludge formation is non-contractility of gall bladder after suppression of oral food intake this non-contractility leads to hypotonicity and stasis. In addition, dilatation of gall bladder occurs in late post-operative period after elective gastric surgery, may be as a sequel to the inadvertent injury to branch of vagus nerve to gall bladder.[10] Which was shown in study 'The role of gallbladder in the pathogenesis of cholesterol gall stones'.[11]

When study compared the sludge formation in surgery for duodenum or stomach 71.7% patient showed sludge formation which was significantly higher when compared to other surgeries. Possible explanation for this also may be inadvertent injury to the branch of vagus to gall bladder in surgeries of stomach and duodenum. This difference was not significant in study by Bolondi et al.[8] Patient under prolonged fasting with TPN support can develop acute acalculous cholecystitis but in our study of patients it was not reported.[3,12]

The main drawback of our study was there was no USG done daily postoperatively which may have been shown the exact day of sludge formation. Duration of anaesthesia was also not taken into consideration. USG was not done after stopping fasting which in some patient may have been shown no sludge. Patient should have been followed after 6 months to 12 years to show the % age of sludge positive which would develop gall stone.[13]

CONCLUSION

This study supports that the prolonged restriction of oral food intake in patient operated on the gastrointestinal tract that results in decreased contractility due to absence of food stimulated gall bladder contraction, may be an important cause to sludge development in our group of patients.

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