

Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring you “**ENTERON**” which contains latest and interesting news in the field of Gastroenterology.

- Analysis of the emergency surgical treatment of diverticular disease.
- Investigation of the association between dietary fatty acid intake and calcification of the abdominal aorta.
- Prediction of lymphovascular invasion and perineural invasion status using predictive model combining clinical and spectral computed tomography parameters.
- Case report on bouveret syndrome- a rare kind of gallstone ileus

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Best Regards,

Medical Team, Micro Labs Ltd

ANALYSIS OF THE EMERGENCY SURGICAL TREATMENT OF DIVERTICULAR DISEASE

INTRODUCTION

Diverticulosis, or the presence of colonic diverticula, is a prevalent gastrointestinal illness in the Western world, with a growing incidence rate, particularly among people aged 18 to 64 years. Diverticulosis is more common as people get older. Similarly, increasing body mass index, lack of physical activity, nonsteroidal anti-inflammatory medications, and heredity all play an important part in its aetiology. In contrast, a high-fiber diet lowers risk.¹ Perforated diverticulitis is a potentially fatal illness, and its treatment has been much contested in recent years. Up to 35% of patients will have perforated illness with purulent or feculent contamination. Laparoscopic peritoneal lavage (LPL), a minimally invasive procedure, was initially described in 1996. It has shown promise as an alternative to sigmoid resection (SR) in patients with purulent peritonitis caused by perforated diverticulitis. Less-invasive and organ-preserving surgery has long been tempting due of the speedier operation and recuperation durations, as well as the avoidance of stoma and anastomosis.² The aim of the study was to investigate the surgical management of diverticular illness.

METHODS

This was a population based observational study conducted on patients who had surgery due to diverticulitis. Only emergency admissions and those who underwent surgical procedures because of diverticulitis were included. The procedures were divided into two groups: LPL and SR, with or without stomas. Every operation code was examined independently. The National Patient Register (NPR) included baseline patient information and outcome data, including as age, sex, date of admission, type of admission (emergency/elective), duration of hospital stay, and NOMESCO codes for prior abdominal surgery. The index surgery was the first emergency procedure performed due to diverticular illness throughout the research period. The group was followed up on from January 1, 1997, to the index date in order to evaluate co-morbidities, prior abdominal operations, and diverticular disease hospitalizations. To represent co-morbidity, a composite score was computed using the Charlson Co-Morbidity Index (CCI) method, which was modified for the ICD-10 edition. From January 1, 1997, to the conclusion of the research period or death, all stoma-related procedures, including stoma creations and reversals, were examined. Crossover procedures (SR after LPL), subsequent surgery related to diverticular disease, death, colorectal cancer diagnoses, and non-elective readmission for diverticular illness were the outcomes of interest. The quantity of surviving patients who underwent a stoma within the first three years of follow-up was another noteworthy result.

RESULTS

The study results showed that 1608 patients had SR procedures and 427 individuals had LPL procedures. Of all the cases, 1822 (89.5%) had a main diagnostic code, whereas 1801 had a diagnostic code for diverticular illness. Diverticular illness was the secondary diagnosis code for the remaining cases. Diverticular bleeding did not have a code for any patient. It was 67.3 years old on average. Of 427 patients in the LPL group, 9 had crossover surgery to SR (2.1%). Of the 418 patients (1.9%) who received LPL without a surgical record of SR on the index date, 8 had a stoma formed. Furthermore, of the 1608 patients (77.1%) who had SR, 1239 had stomas constructed. Patients who had LPL had lower CCI scores ($P < 0.001$) and were younger (mean age 62.3 versus 69.4 in the SR group) as compared to the other group. In the LPL group, there were fewer patients with a prior history of abdominal surgery (22.2% versus 27.7%, $P = 0.024$). In a similar vein, fewer patients from the LPL group than the SR group had a history of diverticular illness (20.6% versus 33.7%, $P < 0.001$). From 51 LPL (17%) in 2015 to 75 LPL (25%) in 2020, the percentage of LPL procedures to all operations for the relevant year was gradually rising. From 51 LPL (17%) in 2015 to 75 LPL (25%) in 2020, the percentage of LPL procedures to all operations for the relevant year increased gradually over time (Figure 1). Lastly, a comparison of the surgical techniques used by various facilities in each county with respect to the catchment region was made. With an intraclass correlation value of 0.8, the centers were found to be reasonably comparable. LPL was linked to a decreased 30-day mortality rate (3.5% versus 8.7%, $P < 0.001$) and a shorter postoperative hospital stay (mean 9.4 versus 14.9 days, $P < 0.001$). The SR group had a higher frequency for subsequent surgery related to diverticular illness than the LPL group, with the exception of the first year ($P < 0.001$). Throughout the trial period, the mortality rate for LPL was reduced (stratified HR 0.70, 95% CI 0.53–0.92, $P = 0.023$).

DISCUSSION

The current study showed that, compared to SR, LPL was linked to a shorter hospital stay and a 50% lower 30-day mortality rate. In general, LPL was linked to a higher requirement for later surgery related to diverticular illness during the first year. For certain individuals who were clinically determined to need surgery, laparoscopic lavage was a safe substitute for sigmoid resection.² Similar to this study, Shaikh FM et al. study showed that when managing acute perforated sigmoid diverticulitis, laparoscopic peritoneal lavage was a rapid and safe alternative. Without affecting perioperative mortality or significant morbidity, LPL causes greater rates of postoperative abscess development than SR, necessitating more percutaneous drainage operations.³

CONCLUSION

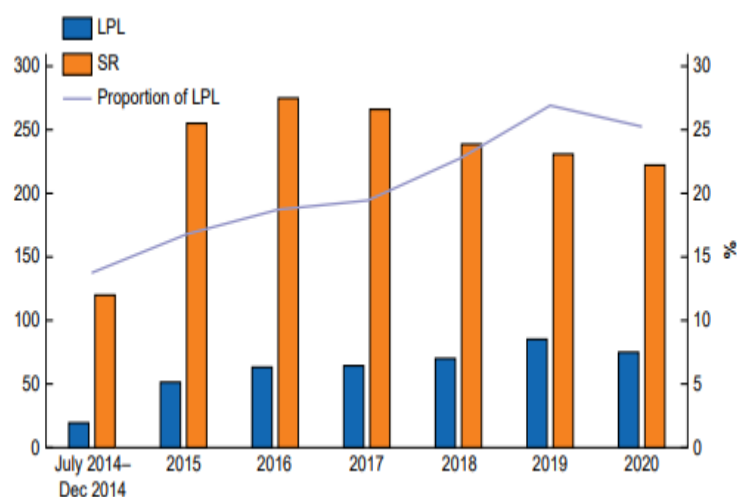


Figure 1. Type of surgery for diverticular disease (July 2014–December 2020)

The current study concluded that the subgroup of younger, healthier patients without a history of abdominal surgery who may be chosen for laparoscopic lavage and potentially spared from the mortality and morbidity linked to surgical resection and a potentially permanent colostomy underscored the significance of this therapeutic option.

Laparoscopic lavage was a safe alternative to sigmoid resection for certain individuals who require surgery.

REFERENCES

1. Guimarães MA, Barbosa LE. Safety and effectiveness of laparoscopic peritoneal lavage in Hinchey III diverticulitis. *Journal of Coloproctology (Rio de Janeiro)*. 2020 Aug 14;40:300-8.
2. Christos K, Filip S, Wilhelm G. Evaluation of laparoscopic peritoneal lavage for perforated diverticulitis: a national registry-based study. *British Journal of Surgery*. 2024 May;111(5):znae109.
3. Shaikh FM, Stewart PM, Walsh SR, Davies RJ. Laparoscopic peritoneal lavage or surgical resection for acute perforated sigmoid diverticulitis: a systematic review and meta-analysis. *International Journal of Surgery*. 2017 Feb 1;38:130-7.

INVESTIGATION OF THE ASSOCIATION BETWEEN DIETARY FATTY ACID INTAKE AND CALCIFICATION OF THE ABDOMINAL AORTA

INTRODUCTION

Abdominal aortic calcification (AAC), which is defined as the abnormal deposition of minerals such as calcium and phosphate within the abdominal aorta wall, is an early indicator of atherosclerotic calcification and predicts cardiovascular events and overall mortality independently, often prior to coronary artery calcification.¹ Dietary fibres, which is often recognized as a good ingredient, has been shown to benefit a variety of ailments, including arterial stiffness, hypertension, and cardiovascular diseases (CVDs).² The dietary consumption of fatty acids, particularly omega-3 and omega-6, has been a major emphasis in cardiovascular health studies.² Nevertheless the National Health and Nutrition Examination Survey (NHANES) hasn't really looked at the connection between these fatty acids in general and AAC in particular. It was plausible to speculate about a possible connection between fatty acid consumption and the development of AAC given the recognized correlations between fatty acid intake and cardiovascular risk factors. The purpose of this study was to look at the relationships between dietary fatty acid consumption and AAC.¹

METHODS

This was a cross-sectional study conducted on 2,897 people who were 40 years of age or older using information from the NHANES. Dietary recall interviews lasting 24 hours were used to analyze dietary fatty acids. The study focused mostly on the consumption of polyunsaturated (PUFA), monounsaturated (MUFA), and saturated (SFA) fatty acids, especially omega-3 and omega-6. In this study, the Kauppila AAC score—which was derived from dual-energy X-ray absorptiometry (DXA) scans that focussed on the lateral lumbar spine—was used to assess

AAC. The possible impact of the variables on the relationships between dietary fatty acid and AAC served as a guidance in the selection of these factors for this investigation. The factors that were taken into account were the following: body mass index (BMI), family poverty income ratio (PIR), sex, age, race, education level, total energy consumption, diabetes status, hypertension status, usage of hypertension medication, and total cholesterol levels. To find out how dietary fatty acid consumption and AAC related to various demographic groups—especially sex and age groups—subgroup studies were carried out.

RESULTS

The participants were 2,897 adults with a mean age of 58.6 ± 11.9 years. Of them, 2,030 (70.7%) had no AAC, 553 (19.9%) had non-severe AAC, and 314 (10.8%) had severe AAC (AAC score >6). The average consumption of different fatty acids (SFA, MUFA, PUFA, Omega-3, and Omega-6) in various demographic groups was shown in Figure 1. The connection for MUFA did not achieve statistical significance, there were observed associations showing that greater consumption of SFA and PUFA was related with an increased effect on AAC scores. AAC scores were shown to be impacted by increases in SFA and PUFA consumption of 1 g per day, as indicated by effect sizes of 0.01 [95% CI: 0.01, 0.03] for SFA and 0.02 [95% CI: 0.00, 0.03] for PUFA, respectively. On the other hand, increased consumption of Omega-3 and Omega-6 fatty acids was linked to a drop in AAC scores; the favorable correlations were shown by effect sizes of -0.05 [95% CI: -0.08, -0.02] for Omega-3 and -0.09 [95% CI: -0.12, -0.06] for Omega-6. The three main dietary fatty acid intakes were positively correlated with severe AAC, while the intake of Omega-3 and Omega-6 fatty acids was negatively correlated with severe AAC. In particular, the chances of severe AAC rose by ORs of 1.01 for SFA, 1.01 for MUFA, and 1.02 for PUFA for every 1 g per day increase in consumption. This means that the odds of severe AAC increased by 1%, 1%, and 2%, respectively. On the other hand, intake of Omega-3 and Omega-6 was linked to lower chances of severe AAC, with ORs of 0.98 and 0.96, respectively, meaning that the odds of severe AAC were reduced by 2% and 4%. The chances of severe AAC were considerably lower in those with larger intakes of Omega-3 and Omega-6, with ORs of 0.76 [95% CI: 0.55, 0.97] and 0.50 [95% CI: 0.28, 0.78], respectively (P for trend <0.05). All categories showed similar correlations between dietary fatty acids and AAC score and severe AAC: negative connections between Omega-3 and Omega-6 consumption and AAC and favorable associations between SFA, MUFA, and PUFA intake and AAC. Nevertheless, it was important to note that while the negative correlation between omega-3 and omega-6 intake and AAC persisted in the two age subgroups (60–80 years and <60 years), the 60–80 year olds' exposure to omega-3 and omega-6 intake significantly increased their risk of severe AAC.

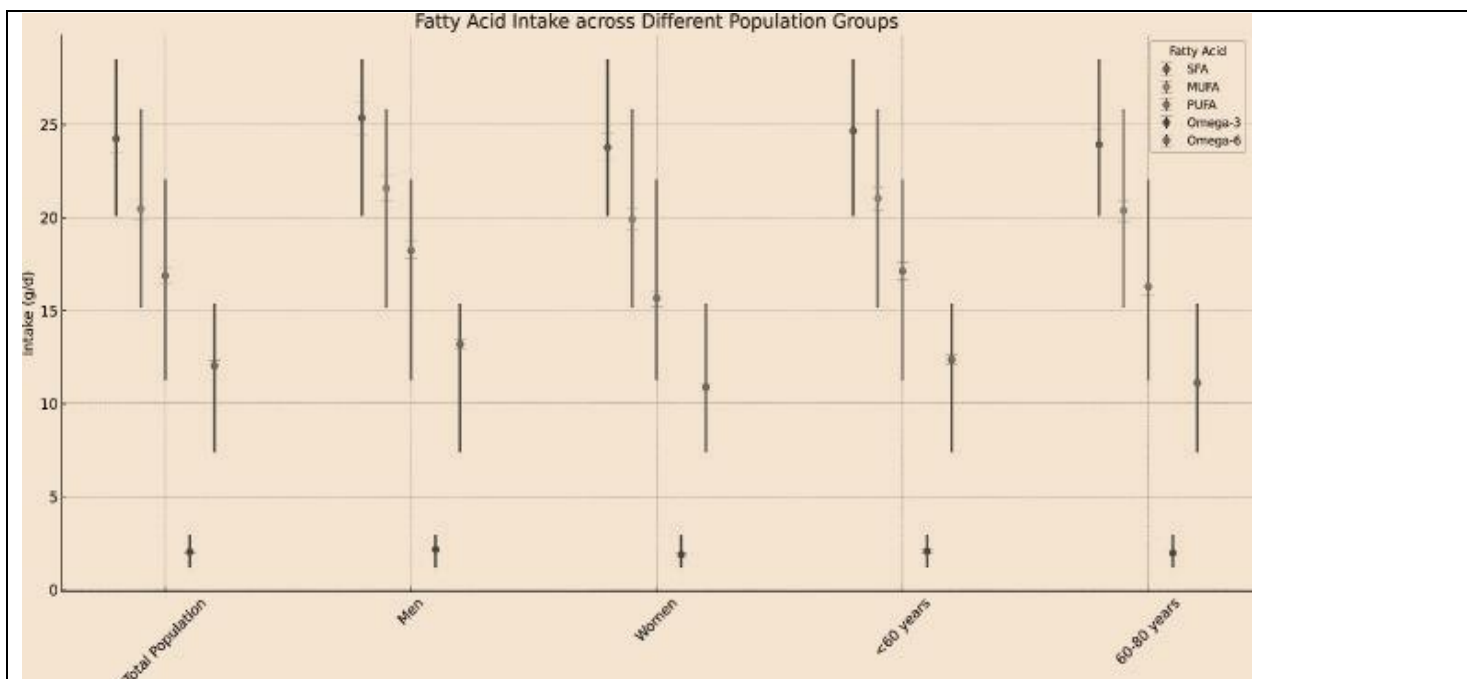


Figure 1. Distribution of fatty acid consumption among various demographic subgroups. Every sort of fatty acid has its own colour and symbol, and the error bars show the standard deviation around the mean intake. Furthermore, solid lines show the range of consumption for every fatty acid, giving a thorough picture of dietary habits among these groups.

DISCUSSION

The current study showed that correlations between AAC and dietary fatty acids. Increased consumption of the three main dietary fatty acid classes—SFA, MUFA, and PUFA—was shown to be positively correlated with AAC, whereas intake of Omega-3 and Omega-6 was found to be adversely correlated.¹ Similar to this, Abdelhamid AS et al. showed that the risk of CVD was negatively correlated with the consumption of omega-3 and omega-6 fatty acids.³

CONCLUSION

This study observed positive associations between increased intake of the three major classes of dietary fatty acids (SFA, MUFA, PUFA) and AAC, whereas Omega-3 and Omega-6 intake were negatively associated. These findings suggested a potential role for dietary fatty acids in the regulation of vascular health, particularly with respect to AAC, which was known to predict cardiovascular disease morbidity and mortality.

The significance of dietary fatty acid composition in the occurrence of AAC was highlighted by this study, along with any possible implications for dietary recommendations and cardiovascular disease preventative methods.

REFERENCES

1. Xiao Y, Quan Y. Associations between dietary fatty acids intake and abdominal aortic calcification: a national population-based study. *Lipids Health Dis.* 2024 Mar 9;23(1):73.
2. Sun Y, Zhang H, Tian W. Dietary fiber and prevalence of abdominal aortic calcification in the United States (from the national health and nutrition examination survey data [2013–2014]). *Nutrition Journal.* 2022 May 6;21(1):25.
3. Abdelhamid AS, Brown TJ, Brainard JS, Biswas P, Thorpe GC, Moore HJ, Deane KH, AlAbdulghafoor FK, Summerbell CD, Worthington HV, et al. Omega-3 fatty acids for the primary and secondary prevention of cardiovascular disease. *Cochrane Database Syst Rev.* 2018;7(7):Cd003177.

PREDICTION OF LYMPHOVASCULAR INVASION AND PERINEURAL INVASION STATUS USING PREDICTIVE MODEL COMBINING CLINICAL AND SPECTRAL COMPUTED TOMOGRAPHY PARAMETERS

INTRODUCTION

Gastric cancer (GC) is a significant global health issue, ranking fifth in incidence and fourth in mortality worldwide. Accurate preoperative assessment of GC stage and tumor invasiveness is essential for personalized treatment. Lymphovascular invasion (LVI) and perineural invasion (PNI) are critical for predicting tumor stage, depth of invasion, lymphatic metastasis, and distant metastasis, thereby serving as indicators for patient prognosis and treatment response. Currently, LVI and PNI are diagnosed postoperatively, but preoperative assessment using spectral CT imaging and machine learning algorithms may improve prediction accuracy.¹ Spectral CT is a novel computed tomography modality that can enhance minute variations inside tissues by providing quantitative data derived from substance composition analysis. According to earlier research, spectral CT may be useful for GC diagnosis, type, and stage determination.² The aim of this study was to create and evaluate a machine learning model that combines clinical markers with spectral CT data to reliably predict LVI/PNI status.

METHODS

A retrospective dataset comprising 257 GC patients (training cohort: $n = 172$; validation cohort: $n = 85$) was used in this investigation. Initially, a number of clinical markers were extracted from the defined tumor regions, including serum tumor markers, CT-TN stages, and CT-detected extramural vein invasion (CT-EMVI). Quantitative spectral CT parameters were also extracted. Next, informative clinical and spectral CT parameters were chosen using a two-step feature selection method inside a 10-fold cross-validation loop that combined correlation-based techniques and information gain ranking. In order to predict LVI/PNI status, a nomogram model based on logistic regression (LR) was subsequently built, and its effectiveness was assessed using the area under the receiver operating characteristic curve (AUC).

RESULTS

The current study results showed that there were no significant differences in sex or age between the LVI/PNI-positive and LVI/PNI-negative groups in both training and validation cohorts. Significant differences were found

in CT T3-4 stage, CT-N positive status, and CT-EMVI positive status between the LVI/PNI-positive and negative groups. Serum levels of CA72-4 and CA19-9 were higher in the LVI/PNI-positive group in the training cohort, but not in the validation cohort. AFP, CEA, and CA125 levels showed no significant differences. The LVI/PNI-positive group exhibited higher values for CT at 40 keV, 70 keV, 120 keV, 140 keV, K40-70, Zeff, IC, and NIC across arterial, portal venous, and equilibrium phases. The inter- and intraobserver reproducibility for these parameters was good (ICCs ≥ 0.75). After dimensionality reduction, four features—CT-T stage, CT-EMVI, VP-70 keV CT value, and EP-NIC—were selected for the LR model. The LR model demonstrated that CT-T stage (OR = 2.683), CT-EMVI (OR = 3.396), VP-70 keV CT value (OR = 1.047), and EP-NIC (OR = 117.723) were independent predictors of LVI/PNI status. The risk factors for perineural and lymphovascular invasion in gastric cancer as presented in table 1. The AUC for the LR model was 0.918 in the training cohort and 0.874 in the validation cohort. The model outperformed single independent factors, with significant differences in AUCs. The nomogram showed good calibration (Hosmer-Lemeshow test $P = 0.6051$) and the decision curve analysis indicated a net benefit for patient stratification between threshold probabilities of 0.10 and 0.95.

Variables	Feature selection		Individual nomogram		
	BestFirst with probability (%)	InfoGainAttributeEval with average merit	Z value	OR (95%CI)	P value
CT-EMVI	100	0.203 $\pm$ 0.016	2.451	3.396 (1.277-9.027)	0.014
CT-T	100	0.263 $\pm$ 0.018	2.177	2.683 (1.103-6.523)	0.029
VP-70kev	90	0.356 $\pm$ 0.016	3.565	1.047 (1.021-1.074)	< 0.001
EP-NIC	90	0.239 $\pm$ 0.016	2.934	117.723 (4.867-2847.564)	0.003
CT-N	100	0.197 $\pm$ 0.014			

Table 1. Risk factors for perineural and lymphovascular invasion in gastric cancer

DISCUSSION

The current study showed that there was a higher likelihood of vascular nerve invasion in the T3–4 stage.¹ Similar to this, Yardımcı AH et al. showed that clinical T stage to be a prognostic factor for LVI. Despite a significant difference in the N status established by CT as per the χ^2 test, the InfoGainAttributeEval tool eliminated it.³

CONCLUSION

This study demonstrated the feasibility of using spectral CT parameters to preoperatively predict LVI and PNI in gastric adenocarcinoma patients. Despite limitations, the results suggested that this noninvasive approach could enable individualized risk stratification and optimize treatment strategies. Further multicenter studies were necessary to validate these findings.

Effective preoperative identification of LVI/PNI in GC was made possible by utilising portal venous and EP spectral CT parameters, with accuracy increased by including clinical indicators.

REFERENCES

1. Ge HT, Chen JW, Wang LL, Zou TX, Zheng B, Liu YF, Xue YJ, Lin WW. Preoperative prediction of lymphovascular and perineural invasion in gastric cancer using spectral computed tomography imaging and machine learning. *World J Gastroenterol.* 2024 Feb 14;30(6):542-555.
2. Ren T, Zhang W, Li S, Deng L, Xue C, Li Z, Liu S, Sun J, Zhou J. Combination of clinical and spectral-CT parameters for predicting lymphovascular and perineural invasion in gastric cancer. *Diagn Interv Imaging.* 2022 Dec;103(12):584-593.
3. Yardımcı AH, Koçak B, Turan Bektaş C, Sel İ, Yarıkkaya E, Dursun N, Bektaş H, Usul Afşar Ç, Gürsu RU, Kılıçkesmez Ö. Tubular gastric adenocarcinoma: machine learning-based CT texture analysis for predicting lymphovascular and perineural invasion. *Diagn Interv Radiol.* 2020 Nov;26(6):515-522.

CASE REPORT ON BOUVERET SYNDROME- A RARE KIND OF GALLSTONE ILEUS

INTRODUCTION

Bouveret's syndrome is a very rare cause of gastric outlet obstruction occurring as a relatively uncommon form of gastric outlet blockage that develops as a consequence of cholelithiasis and cholecystogastric or cholecystoenteric fistula. In the absence of timely diagnosis and treatment, Bouveret's syndrome was linked to a significant risk of morbidity and mortality. Metabolic disturbances, aspiration pneumonia, and surgical complications are among the major causes of death in this condition.¹ A gallstone that has moved into the duodenum or stomach and impactioned causes a mechanical blockage of the gastrointestinal tract, which was an indication of this illness. This case study aimed to investigate the several aspect of Bouveret Syndrome, ranging from its clinical manifestation to techniques of diagnosis and treatment plans.²

CASE REPORT

An 82-year-old female patient who had a history of gallstones, coronary stenting, and coronary artery disease came with nausea, vomiting, and postprandial stomach discomfort that persisted for two weeks. The patient also showed signs of extracellular dehydration, including a persistent mucosal fold, clammy skin with reduced elasticity, and sunken eyes. Additionally, the patient's blood pressure was 10/6 and his pulse rate was 102 beats per minute. Hypochloremia and hypokalemia were detected by laboratory testing. There was a decrease in urine production following the insertion of the urinary catheter. A nasogastric tube was inserted to begin resuscitation, and it quickly emptied 400 cc of stomach contents. Based on the input-output evaluation, fluid resuscitation was carried out with the intention of resolving any hydro electrolytic imbalances. Following patient stabilization, an

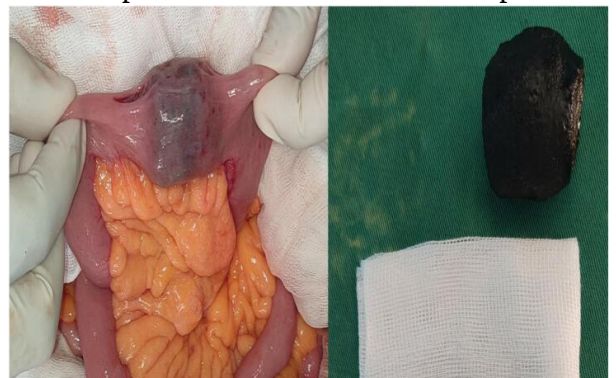


Figure 1. The stone was effectively extracted once it reached the second jejunal loop.

esophagogastroduodenoscopy showing no duodenal dilatation and some residual bile in the EGD indicated normal results up to the second section of the duodenum. In order to determine the aetiology of the symptoms and indications of gastric outlet blockage, a supplementary abdominal computed tomography was done. The results revealed a cholecystoduodenal fistula with a 4 cm stone lodged at the duodenojejunal junction. It was decided to move forward with surgery because there was no endoscopic therapy available at the time. A stone that had lodged was discovered at the duodenojejunal angle during laparotomy. The stone was effectively moved to the second jejunal loop [Figure 1], where it was extracted by performing an enterotomy. Subsequently, they made the decision to implement a latero-lateral gastroenteroanastomosis, without stomach resection, on the second jejunal loop utilizing this enterotomy. Nothing changed regarding the cholecystoduodenal fistula. The patient underwent a smooth postoperative recovery, and on the eighth day following the procedure, they were allowed to go home. The 3-month follow-up went without incident.

DISCUSSION

This case report showed that CT scan reveals Rigler triad, including pneumobilia, stomach distention, and a massive gallstone at the duodenojejunal junction.² Similar to this, Shah FA et al. showed that a CT scan of the abdomen and pelvis with contrast revealed gallstone ileus caused by a bilioduodenal fistula in the left lower quadrant.³

CONCLUSION

The current study concluded that bouveret syndrome, although uncommon, requires attention and vigilance. Improving patient outcomes requires timely diagnosis and proper care. EGD and, more commonly, CT scans were used to make the diagnosis. If surgery is not an option, endoscopic gallstone removal may be recommended as a first-line therapy. Enterotomy or gastrotomy may be proposed. The treatment of the fistula remains the most contentious subject; a one- or two-stage operation was available depending on the patient's stability and comorbidities.

With ECG and CT scans playing crucial roles in diagnosis, this case highlights the need of awareness, prompt diagnosis, and suitable care. In cases when endoscopic techniques are not accessible, surgical surgery is still a feasible course of therapy.

REFERENCES

1. Bruni SG, Pickup M, Thorpe D. Bouveret's syndrome—a rare form of gallstone ileus causing death: appearance on post-mortem CT and MRI. *BJR case reports*. 2017 May 20;3(3):20170032.
2. Atri S, Elaifia R, Sebai A, Hammami M, Haddad A, Kacem JM. Bouveret Syndrome: A rare form of gallstone ileus a case report. *Int J Surg Case Rep*. 2024 Mar;116:109438.
3. Shah FA, Winkle SM, Truitt T, Guez G, Draper K. Bouveret Syndrome: A Rare Form of Gallstone Ileus. *Cureus*. 2021 Mar 22;13(3):e14042.



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