

Original Research Article

Assessing the severity grading of acute cholecystitis according to Tokyo guidelines 2013 and outcome of conservative management

Asif Iqbal¹, Fozia Hussain Shah², Mubashir Gani^{1*}, Sameer H. Naqash², Mubashir A. Shah²

¹Department of General Surgery, SKIMS Medical College Bemina, Srinagar, Jammu and Kashmir, India

²Department of General and Minimal Invasive Surgery, Sher-I- Kashmir Institute of Medical Sciences, Soura, Srinagar, Jammu and Kashmir, India

Received: 25 January 2025

Revised: 18 February 2025

Accepted: 01 March 2025

*Correspondence:

Dr. Mubashir Gani,

E-mail: mubashir.gani72@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Acute cholecystitis is most often triggered by gall stones. Gall stones are one of the most common disorders of the gastrointestinal tract, affecting about 10% of people in Western society.

Methods: This prospective observational was conducted in the department of General Surgery, Sher e Kashmir Institute of Medical Sciences and SKIMS Medical College from September 2018 to August 2020 comprising of 112 patients. The severity of cholecystitis according to TG13 was noted. All the patients were managed conservatively. Patients were closely monitored for any change in severity.

Results: A total of 112 patients were studied with male: female ratio of 1:3.5. The maximum number of patients were in the age group of 45 to 59 years with a mean age of 50.3 years, 63.4% of patients were associated with comorbidities. LFT was deranged in only 21.4% of the patients All the patients were assessed for the severity of illness according to the Tokyo guidelines (TG 13). 64 (57.1%) patients had mild illness, 43 patients (38.4%) had moderate illness and 05 patients (4.5%) had severe illness. 84.8% (95) of the patients improved by conservative management. 03 patients belonging to severe grade needed open surgical intervention. 01-patient died in postoperative period. Most of the patients had a hospital stay of less than 01 week with mean duration of 3.8 days. Most patients with mild to moderate disease were below 60 years. All the grades of severity were more common in females.

Conclusions: Most patients with acute cholecystitis can be managed conservatively.

Keywords: Cholecystitis, Cholecystectomy, Gall Stones, Tokyo guidelines

INTRODUCTION

Acute cholecystitis refers to acute inflammation that involves wall of gall bladder.¹ About 95% of people with acute cholecystitis have gallstones (calculous cholecystitis) and 5% lack gallstones (acalculous cholecystitis).² More than 80% of people with gallstones are asymptomatic. Acute cholecystitis develops in 1-3% of patients with symptomatic cholelithiasis.³

It is caused by an obstruction of the cystic duct, eventually determining biliary stasis, which, in turn, initiates a cascade of inflammatory changes, affecting the

gallbladder epithelium to the point where it becomes necrotic and thus could turn into a full-blown infection.⁴ Secondary bacterial infection with enteric organism occur in about 20% of cases.⁵ Patients present with the acute constant pain in the right upper abdomen which may radiate to the epigastrium, posterior right scapula or right shoulder area. The pain is usually precipitated by ingestion of a fatty meal and associated with nausea and vomiting.⁶ Ultrasound scanning is the investigation of choice in patients suspected of having acute cholecystitis. Biliary scintigraphy hydroxy iminodiacetic acid (HIDA) can be done when the diagnosis remains in doubt after ultrasound scanning.⁷ Most patients with acute cholecystitis respond

to conservative. It includes hospital admission, nil per oral, rehydration with intravenous fluids and systemic antibiotics. Third generation cephalosporins with anaerobic coverage should be used. Reassessment of conservative management should be done frequently.

Patients who respond to conservative management should have laparoscopic cholecystectomy either early (24-72 hours of onset) or delayed (6-12 weeks later).⁸ Patient who undergo early laparoscopic cholecystectomy within 72 hours have lower complication rates, lower conversion rates and shorter hospital stays than those undergoing interval surgery.⁹⁻¹³ Although it is desirable to operate within this time period, it is often difficult to do so in clinical practice.

Tokyo guidelines (TG13)

TG13 diagnostic criteria and severity grading of acute cholecystitis have become widely adopted in recent years; being used not only in clinical practice but also in numerous research studies on this disease

Grade III (severe) acute cholecystitis

Grade III acute cholecystitis is associated with dysfunction of any one of the following organs/systems. Cardiovascular dysfunction: Hypotension requiring treatment with dopamine ≥ 5 $\mu\text{g/kg}$ per min or any dose of norepinephrine. Neurological dysfunction: Decreased level of consciousness. Respiratory dysfunction: $\text{PaO}_2/\text{FiO}_2$ ratio >300 . Renal dysfunction: Oliguria, creatinine >2.0 mg/dl. Hepatic dysfunction: PT-INR >1.5 . Hematological dysfunction: Platelet count $>100,000/\text{mm}$

Grade II (moderate) acute cholecystitis

Associated with any one of the conditions, Elevated white blood cell count ($>18,000/\text{mm}^3$). Palpable tender mass in the right upper abdominal quadrant. Duration of complaints >72 h. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis)

Grade I (mild) acute cholecystitis

Does not meet the criteria of Grade III or Grade II acute cholecystitis. Grade I can also be defined as acute cholecystitis in a healthy patient with no organ dysfunction and mild inflammatory changes in the gallbladder. The aim of our study was to assessing the severity grading of acute cholecystitis according to Tokyo guidelines 2013 and outcome of conservative management.

METHODS

Study type

The study was a prospective observational study.

Study place

The study was conducted in the department of General and minimal invasive surgery, Sher-i-Kashmir Institute of Medical Sciences Srinagar and SKIMS Medical College Srinagar.

Study duration

The study was conducted from September 2018 to August 2020 after receiving ethical clearance.

All the patients admitted in emergency and diagnosed as acute cholecystitis were included in the study. The clinical profile of patients and the severity of cholecystitis according to TG13 was noted. All the patients were managed with antibiotics and supportive care. Patients were closely monitored for any change in severity. Any percutaneous intervention, if required, was noted. The need for surgery was taken as a failure of conservative management.

Inclusion criteria

Patients diagnosed with acute cholecystitis. Those who consented for the study. Age above 16 years

Exclusion criteria

Acute cholecystitis associated with cholangitis or CBD stones. Acute cholecystitis associated with pancreatitis. Suspected malignancy. Patients with other associated pathology which needed surgical intervention.

Ethical approval

Proper ethical approval was taken from the institutional ethical committee.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean $\pm$ SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar and pie diagrams. Student's independent t-test or Mann-Whitney U-test, whichever feasible, was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed

RESULTS

This study was conducted in the Department of General and Minimal Invasive Surgery at Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Kashmir. It was

a prospective observational study conducted between September 2018 to August 2020. A total of 112 patients were enrolled in our study. The maximum number of patients were in the age group of 45 to 59 years with a mean age of 50.3 years. 35 patients (31.3%) in subgroup of 45-59 years, 28 patients (25%) in subgroup 60-74 years, 26 patients (23.2%) in subgroup 30-44 years and 13 patients (11.6%) in the subgroup 15-29 years and 10 patients (8.9%) were ≥ 75 years of age (Table 1). Majority of the patients in our study were females which comprised 78% of the total patients with male: female ratio of 1:3.5. (Figure 1).

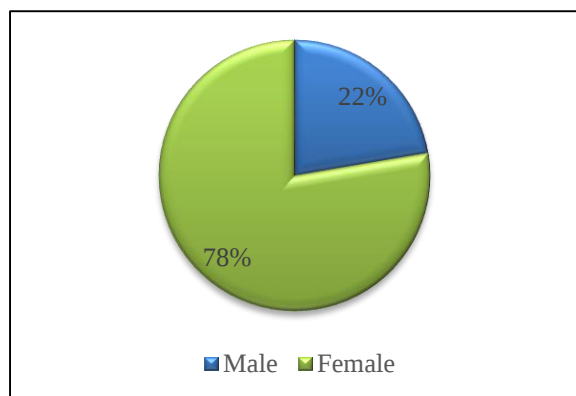


Figure 1: Gender distribution of study patients.

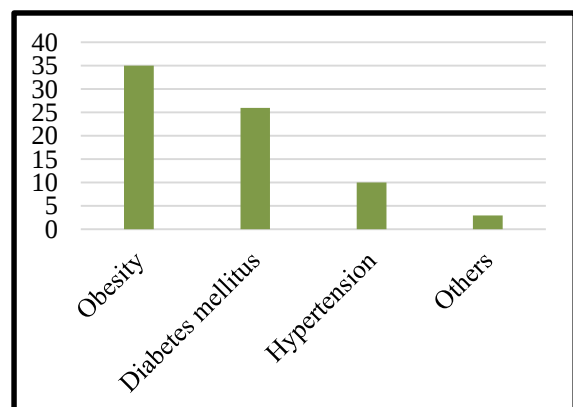


Figure 2: Underlying comorbidities of study patients.

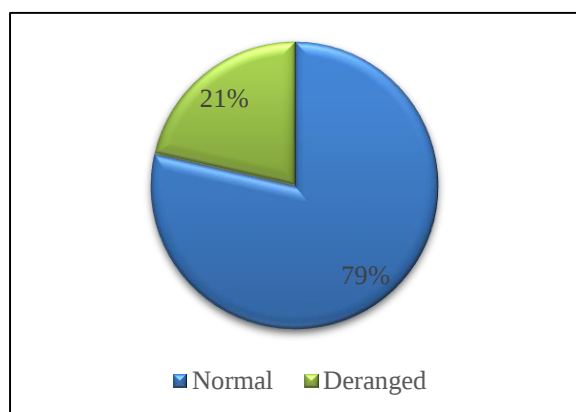


Figure 3: Liver function test (LFT) of study patients.

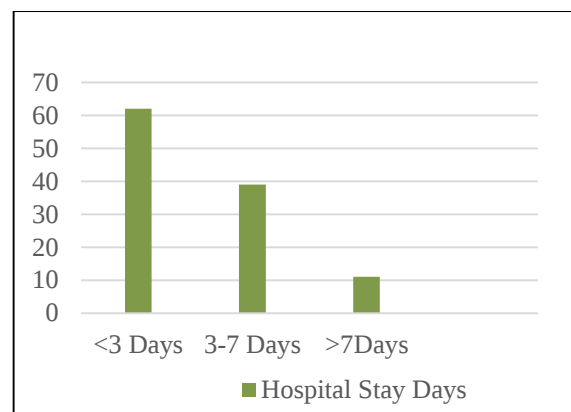


Figure 4: Distribution of study patients as per hospital stay.

Among the 112 patients enrolled in our study, 71 patients were associated with other comorbidities which comprises 63.4% of the total patients. 36.3% of patients were not associated with any other comorbidity. The most common associated comorbidity was obesity which was seen in 35 (31.3%) of patients followed by diabetes mellitus which was seen in 26 (23.2 %) of patients and hypertension seen in 10 (8.9%) of patients (Figure 2). LFT was done in all the patients on admission to the hospital along with other baseline investigations. LFT was normal in majority 88 (79%) of the patients. It was deranged in 24 (21%) of the patients (bilirubin $\leq$ 2.5 mg/dl, ALT $\leq$ 60 mg/dl, ALP $\leq$ 180 mg/dl) (Figure 3). All the patients enrolled in the study were assessed for their severity of illness according to the TOKYO guidelines (TG13).

Patients were assigned into mild, moderate or severe illness. Among the 112 patients 64 (57.1%) had mild illness, 43 patients (38.4%) had moderate illness and 05 patients (4.5%) had severe illness (Table 2). All the patients were started on conservative management. 84.8% (95) of the patients improved by medical management which included intravenous antibiotics, iv fluids and adequate analgesia. USG guided percutaneous cholecystostomy was required in 9.8% (11) patients and USG guided pigtail drainage (for associated contained GB perforation) was needed in 2.7% (3) of the patients. 03 patients belonging to severe grade who did not improve on conservative management needed open surgical intervention.

Among this 1 patient died in postoperative period. All the patients belonging to the mild and moderate grades improved on conservative management whereas only 02 among the 05 patients belonging to the severe category improved on conservative management (Table 3). Only 01 patient died during the course of treatment in hospital giving mortality rate of 0.9%. With conservative management, most of the patients had a hospital stay of less than 01 week. 62 (55.4%) patients improved within 03 days of hospital stay, 39 (34.8%) patients needed a hospital stay of 03 - 07 days and 11 (9.8%) patients stayed in the hospital beyond 01 week. The mean duration of hospital

stay was 3.8 days (Figure 4). In our study, patients below the age of 60 years had only mild to moderate disease with the age group of 45-59 accounting for the majority share of cases. About 4.5% of the cases were found to be severe and all of them were above 60 or above years of age with 60% of severe cases in 60-74 years age group and 40% in the above 75 years age group (Table 4). All the grades of severity were more common in females as females constituted the majority of patients. Among mild cases 12 (18.8%) were males and 52 (81.3%) females, among moderate cases 11 (25.6%) were males and 32 (74.4%)

were females and among severe cases 2 (40%) were males and 3 (60%) were females. The gender distribution of severity had no statistical significance (Table 5). Among the mild cases, 61 (95.3%) of the cases were discharged from the hospital within first 03 days of admission and only 3 (4.7%) of mild cases stayed in the hospital beyond 03 days. Among moderate cases only 8 (18.6%) cases were discharged within first 03 days of admission and 35 (81.4%) of cases needed a hospital stay of more than 03 days. All the severe cases needed a hospital stay of more than 03 days (Table 6).

Table 1: Age distribution of study patients.

Age (in years)	Number	%
15-29	13	11.6
30-44	26	23.2
45-59	35	31.3
60-74	28	25.0
≥ 75	10	8.9
Total	112	100

Mean±SD (Range)=50.3±16.43 (15-90)

Table 2: Severity grading of study patients according to TOKYO guidelines (TG13).

Severity grading	Number	%
Mild	64	57.1
Moderate	43	38.4
Severe	5	4.5
Total	112	100

Table 3: Management of study patients.

Management	Number	%
Conservative	Medical	95
	USG guided percutaneous cholecystostomy	11
	USG pigtail drainage of associated contained GB perforation	3
Surgical (Open)	3	2.7
Total	112	100

Table 4: Severity grading according to age in study patients.

Age (in years)	Mild		Moderate		Severe	
	No	%	No	%	No	%
15-29	9	14.1	4	9.3	0	0
30-44	17	26.6	9	20.9	0	0
45-59	23	35.9	12	27.9	0	0
60-74	12	18.8	13	30.2	3	60
≥ 75	3	4.7	5	11.6	2	40
Total	64	100	43	100	5	100

Chi-square=15.81, p value=0.045 (Statistically significant)

Table 5: Severity grading according to gender in study patients.

Gender	Mild		Moderate		Severe	
	No	%	No	%	No	%
Male	12	18.8	11	25.6	2	40
Female	52	81.3	32	74.4	3	60
Total		100	43	100	5	100

Chi-square=1.636; p value=0.441 (non-significant)

Table 6: Severity grading according to hospital stay in study patients.

	Mild		Moderate		Severe	
	No	%	No	%	No	%
≤ 3 days	61	95.3	8	18.6	0	0
> 3 days	3	4.7	35	81.4	5	100
Total	64	100	43	100	5	100

Chi-square=72.38, p value<0.001 (Statistically significant)

DISCUSSION

This study comprised of 112 cases of acute cholecystitis admitted in the department of General and Minimal Invasive surgery, Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar from September 2018 to August 2020. In this study of 112 cases, most of the patients were in the age range of 15-80 years. Majority of cases were females with an incidence of 77.7% (87 patients) whereas 20.3% (25 patients) were males; with a male to female ratio of 1:3.5. Similar results were shown by studies of Rao et al, Herman et al, Hanif et al, Ganey et al and Moreaux et al.¹⁴⁻¹⁸ 35(31.3%) patients had underlying obesity (BMI≥26 kg/m²) and 26 (23.2%) patients had diabetes mellitus as comorbidity. These findings were consistent with those observed by Palanivelu et al and Liu et al, in their study.^{19,20}

In our study, 88 patients (78.6%) had LFT within normal range. Only 24 patients (21.4%) had mildly deranged LFT (bilirubin≤2.5 mg /dl; ALT≤60 mg/dl; ALP≤180 mg/dl) which got settled with time. Patients who had grossly deranged LFT were evaluated further for the presence of CBD stones or some other cause and were not included in the study. Similar results were shown by Keun Soo Ahn et al, in their study.²¹ These findings imply that the inflammation related LFT abnormalities in acute cholecystitis patients are transient and resolved over time. Deranged LFT along with CBD stones cannot improve without removing the CBD stones.

However, improvements in LFT values during the follow-up period may suggest that the CBD stones were spontaneously passed, avoiding unnecessary ERCP. In our study, 109 patients (97.3%) were managed by conservative approach. 95 patients (84.8%) were treated with iv fluids/analgesics and iv antibiotics; 11 patients (9.8%) with iv fluids/analgesics /antibiotics plus percutaneous cholecystostomy, 3 Patients (2.7%) with iv fluids/antibiotics plus usg-guided pigtail drainage. Combination of piperacillin/tazobactam was antibiotic of choice in majority of the patients.

Only 3 patients (2.7%) who failed conservative management underwent open surgical intervention (open cholecystostomy/open emergency cholecystectomy). Thus, majority of the patients were managed by conservative approach and subsequently they were subjected to elective lap/open cholecystectomy. These results were consistent with the observations made by Janssen et al, Komatsu et al and Bea et al.²²⁻²⁴ Another

study by Kim et al, concluded that percutaneous cholecystostomy is an effective and definitive treatment modality for more than two thirds of patients of acute acalculous and calculous cholecystitis with low rates of recurrent disease and interval cholecystectomy.²⁵ Thus, conservative treatment of acute calculous cholecystitis during index admission seems feasible and safe, especially in patients with mild disease. During long-term follow-up, less than a quarter of the patients appear to develop recurrent gallstone-related disease.

There may be differences in management protocol of acute cholecystitis at different centers. So, the results may vary between our study and other studies.

CONCLUSION

Most patients of acute cholecystitis can be managed conservatively. Percutaneous cholecystostomy can be considered as an alternative treatment option for antibiotic refractory cases. Emergency Laparoscopic cholecystectomy is not possible in every setting. So only those patients who fail to respond to conservative management undergo surgical intervention.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Gallstone Disease: Diagnosis and Management of Cholelithiasis, Cholecystitis and Choledocholithiasis. National Institute for Health and Care Excellence: Clinical Guidelines. London, 2014
2. Indar AA, Beckingham IJ. Acute cholecystitis. BMJ 2002; 325:639–643.
3. Friedman GD. Natural history of asymptomatic and symptomatic gallstones. Am J Surg 1993; 165:399-404.
4. Bjorvatn, B. Cholecystitis-etiology treatment-microbiological aspects. Scand J. Gastroenterol. Suppl. 1984, 90, 65–70.
5. Csendes, A., Burdiles, P., Maluenda, F., Diaz, J.C., Csendes, P., Mitru, N. Simultaneous bacteriologic assessment of bile from gallbladder and common bile duct in control subjects and patients with gallstones and common duct stones. Arch. Surg. 1996;131, 389–394.

6. Kimura Y, Takada T, Kawarada Y, Nimura Y, Hirata K, Sekimoto M, et al. Definitions, pathophysiology and epidemiology of acute cholangitis and cholecystitis: Tokyo Guidelines. *J Hepatobiliary Pancreat Surg.* 2007;14(1):15-26.
7. Oates E, Selland DL, Chin CT, Achong DM. Gallbladder non-visualization with pericholecystic rim sign: morphine-augmentation optimizes diagnosis of acute cholecystitis. *J Nucl Med.* 1996;37:267-9.
8. Gurusamy K, Samraj K, Gluud C, Wilson E, Davidson BR. Meta-analysis of randomized controlled trials on the safety and effectiveness of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *The British J Surg.* 2010;97(2):141-50.
9. Lo CM, Liu CL, Fan ST, Lai EC, Wong J. Prospective randomized study of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Ann Surg.* 1998;227:461-7.
10. Lai PB, Kwong KH, Leung KL, Kwok SP, Chan AC, Chung SC, et al. Randomized trial of early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Br J Surg.* 1998;85:764-7.
11. Pessaux P, Tuech JJ, Rouge C, Duplessis R, Cervi C, Arnaud JP. Laparoscopic cholecystectomy in acute cholecystitis. A prospective comparative study in patients with acute vs. chronic cholecystitis. *Surg Endosc.* 2000;14:358-61.
12. Eldar S, Eitan A, Bickel A, Sabo E, Cohen A, Abrahamson J, et al. The impact of patient delay and physician delay on the outcome of laparoscopic cholecystectomy for acute cholecystitis. *Am J Surg.* 1999;178:303-7.
13. Norrby S, Herlin P, Holmin T, Sjudahl R, Tagesson C. Early or delayed cholecystectomy in acute cholecystitis? A clinical trial. *Br J Surg.* 1983;70:163-5.
14. Rao KS, Meghavathu G, Rao S, Prasad T. Clinical study of gallstone disease and treatment options. *J of Evolution of Medical and Dental Sciences* 2015;4(79):13841-8.
15. Hermann RE. "Biliary disease in the aging patients". New York: Masson; 1983: 227-32.
16. Motiwala HG. Operative technique of cholecystectomy: A study of 250 cases. Macmillan India Limited, 1991; 204.
17. Ganey JB, Johnson PA, Jr, Prillaman PE, McSwain GR. Cholecystectomy: clinical experience with a large series. *Am J Surg.* 1986;151(3): 352-7.
18. Moreaux J. Prospective study of open cholecystectomy for calculous biliary disease. *Br J Surg.* 1994;81(1):116-9.
19. Jayanthi V, Prasanthi R, Surendran R, Palanivelu C. Epidemiology of gall stone disease. *BHJ.* 2020;5:786-9.
20. Liu CM, Tung TH, Chou P, Chen VTK, Hsu CT, Chien WS, et al. Clinical correlation of gallstone disease in a Chinese population in Taiwan: Experience at Cheng Hsin General Hospital. *World J Gastroenterol.* 2006;12(8):1281-61998.
21. Ahn KS, Yoon YS, Han HS, Cho JY. Use of liver function tests as first-line diagnostic tools for predicting common bile duct stones in acute cholecystitis patients. *World J Surg.* 2016;40(8):1925-31.
22. Janssen ERI, Hendriks T, Natroshvili T, Bremers AJA. Retrospective Analysis of Non-Surgical Treatment of Acute Cholecystitis. *Surg Infect (Larchmt).* 2020;21(5):428-32.
23. Komatsu S, Tsuchida S, Wakahara T, Ueno N, Toyokawa A, Watanabe A, et al. Outcomes of Consistent Conservative Management for Acute Cholecystitis Followed by Delayed Cholecystectomy. *Surg Laparosc Endosc Percutan Tech.* 2017;27(5):404-8.
24. Busto Bea V, Caro Patón A, Aller de la Fuente R, González Sagrado M, García Alonso FJ, Pérez-Miranda Castillo M. Acute calculous cholecystitis: a real-life management study in a tertiary teaching hospital. *Rev Esp Enferm Dig.* 2019;111(9):667-71.
25. Kim D, Iqbal SI, Ahari HK, Molgaard CP, Flacke S, Davison BD. Expanding role of percutaneous cholecystostomy and interventional radiology for the management of acute cholecystitis: An analysis of 144 patients. *Diagn Interv Imaging.* 2018;99(1):15-21.

Cite this article as: Iqbal A, Shah FH, Gani M, Naqash SH, Shah MA. Assessing the severity grading of acute cholecystitis according to Tokyo guidelines 2013 and outcome of conservative management. *Int J Res Med Sci* 2025;13:1482-7.