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RESEARCH ARTICLE

"THE OUTCOME OF ULTRASOUND GUIDED PERCUTANEOUS DRAINAGE OF LIVER ABSCESS"

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Abstract

Introduction: Pyogenic liver abscess is aa potentially life-threatening disease with significant morbidity and mortality. Patients usually present with non-specfic symptoms initiallymaking diagnosis and treatment delayed and difficulty. Surgical drainage is associated with morbidity and mortality when compared to minimal invasive procedure and hence the study.

Aims and objectives-This study was conducted with the aim to evaluate the need and the outcome of percutaneous drainage in treatment of liver abscess and also to assess the parameters during the procedure which will improve the clinical outcome.

Methods- prospective observational study conducted in patients with liver abscess who were treated with ultrasound guided percutaneous catheter drainage during the study period. A total of 76 patients were studied.

Results- Percutaneous catheter drainage (PCD) had 100% success rate (reduction in abscess volume by atleast 50%) with early clinical improvement and very few complications.

Conclusion- Percutaneous catheter drainage of abscess is treatment of choice which is minimally invasive and also has higher success rate with earlier and better clinical and radiological improvement.

Introduction:-

Pyogenic liver abscess is aa potentially life-threatening disease with significant morbidity and mortality. Patients usually present with non-specfic symptoms initially[1]. As the disease increases in severity there is appearance of fever, right hypochondrialpain which may or may not be referred to the right shoulder. Since the disease presents with non-specific clinical feature initially, most patients are diagnosed in late stages only. But, advances in sonography and computerized tomography scanning and interventional radiology along with improvements in intensive care, administration of appropriate antibiotic therapy led to greater success in management of patients with liver abscess, thus improving the patient outcome.Ultrasound (USG) is the imaging modality used in the initial evaluation. The appearance on USG varies according to the stage of evolution of the abscess[1]. Initially the abscess is hyperechoic and indistinct, but with maturation and pus formation, it becomes hypoechoic with a distinct margin. When the pus is very thick, a fluid-containing lesion may be confused with a solid lesion on USG. USG has a sensitivity of 75% to 95%, but has difficulty in detecting an abscess high in the dome of the right hemiliver and especially multiple small PLAs[2]. By showing gallstones, dilated bile ducts, and hepatolithiasis, USG has the advantage of imaging underlying biliary tract pathology. A computed tomography (CT) scan is more accurate than

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USG in the differentiation of PLA from other liver lesions and is reported to have a sensitivity of approximately 95%[2]. The portal venous phase using intravenous contrast material gives the best differentiation between the liver and the abscess, with the periphery of the PLA having contrast enhancement as opposed to non-enhancement of the central portion. Magnetic resonance imaging (MRI) does not seem to have any advantage over CT or USG[2].

In recent years, image-guided percutaneous drainage has been increasingly used to treat liver abscesses with reported success rates ranging from 70-100%[3]. Percutaneous placement of an indwelling catheter is the method most widely preferred to drain liver abscesses[4]. There are two main methods in Percutaneous treatment. They are intermittent needle aspiration and continuous catheter drainage. Intermittent needle aspiration is less expensive but has lower success rate than drainage method and it also require repeated aspiration. It has an advantage though those multiple small abscesses can be aspirated through different tracts in the same sitting. Important drawback of aspiration is that repeated needle aspirations may be required in a single patient over a short period of time which is painful and unpleasant for the patients and hence may not be acceptable and larger cavities often reaccumulate. To avoid this unpleasant pain associated with needle aspiration, percutaneous catheter drainage can be used first tool in the management of hepatic abscess and it provides a route for continuous flow of pus and hence the problems of incomplete and repeated evacuations are not a problem.

Methodology:-

This was a prospective observational srudy conducted at our tertiary care centre, Rajendra institute of medical sciences, Ranchi, Jharkhand, for a perioedof 18 months from June 2018 to December 2019. S ample size was duration based i.e., all the patients with liver abscess treated with ultrasound guided percutaneous catheter drainage during this study period.This study was conducted with the aim to evaluate the need and the outcome of percutaneous drainage in treatment of liver abscess and also to assess the parameters during the procedure which will improve the clinical outcome.

Inclusion Criteria-

1.Patients of both the sex and all the age group were included in the study.
2.Abscess cavity size more than or equal to 5cm with liquefied content(partial/complete).
3. Single cavities or unilocular abscess

Exclusion Criteria-

1) Suspected malignancy
2) Co existing coagulopathy
3) Ruptured abscess
4) Signs of peritonitis
5) Multiple abscess, multilocular abscess
6) Ascites

During our study period, 76 patients met our inclusion and exclusion criteria. After applying inclusion and exclusion criteria, a detailed history and examination findings were noted. Documented diagnosis of liver abscess done by ultrasound. Routine investigations like haemogram, liver function tests and coagulation profile were noted. The antibiotic cover which was given was also noted.

Procedure:-

Pigtail catheter drainage procedure was done under ultrasound guidance with involvement of both radiologist and the treating surgeon. The characteristics of the abscess like number, location, size, loculations, echogenicity, liquified or not etc all these are recorded before procedure. In drainage technique, seldinger technique was used to insert catheter by using guide wire into the abscess cavity. Careful localization of the abscess and proper selection of the entry site were pre-requisite for successful procedure. The best route of access was considered to the route in which catheter has traversed as little amount of liver tissue as possible and avoidingpleura and bowel. The skin was anaesthetized 2% lignocaine infiltration and by using a No. 11 blade a small stab was made at the entry site on the anesthetized skin. Under real time sonographic guidance, pigtail catheter was inserted through the skin incision and guided into the abscess cavity. After confirming the proper position, stylet was withdrawn and by using 10cc syringe, the abscess cavity was aspitated and the position confirmed. Then the guide wire was removed and the

catheter was attached to a collecting bag. Then the catheter was secured by suturing with silk 1-0. Sterile dressing was applied and the pus collected was sent for culture and antibiotic sensitivity.

Follow Up

The daily output was monitored. The catheter was flushed daily with 10 ml of normal saline to prevent its blockage with debris. Alternate day Ultrasound examinations were done to monitor the cavity size and volume and to confirm the position of tip of the catheter. Clinical improvement in the patient 's condition was noted.The catheter was removed on the basis of combination of clinical and radiological criteria- i) The drainage should be less than 10ml per day (excluding the catheter flush volume. ii) Fever and raised leucocyte count associated with abscess should be absent. iii) evaluation of residual cavity size (should be reduced by atleast 50%) and presence or absence of any biliary fistula should be done, because if any fistula noted catheter drainage was continued till the fistula closed. The follow up was continued until the resolution of abscess.

Outcome-

The patients' outcome in terms of clinical improvement, time required for improvement of symptoms, duration of hospital stay, lab parameters improvement, USG monitoring- residual volume, recollection noted. Complications of the procedure like sepsis, peritonitis, bowel injury, failure of drainage, catheter tip malposition, haemorrhage, pneumothorax, hemothoraxwere documented if any.

The data was collected systematically and case proforma was filled for every patient. The Paired student T –test was used to analyse the values collected before and after the procedure from t-score and degree of freedom of difference in mean reduction of abscess size.

Observation:-

During the study period, a total of 76 patients were included in the study and following observations were done.

Table no. 1:- Distribution according to clinical characteristics.

Clinical characteristics			**frequency**	**percentage**
Demographic data	Age (mean)		44.62 years	
	Sex	Male	65	85.53
		female	11	14.47
	Socio economic status	upper	5	6.58
		Upper middle	7	9.21
		Lower middle	19	25
		Upper lower	31	40.79
		lower	14	18.42
	residence	urban	18	23.68
		rural	58	76.32
Risk factors	Diabetes mellitus		15	19.73
	Biliary stones		7	9.21
	Alcoholism		39	51.31
	Viral hepatitis		5	6.57
	Prior GI surgery		2	2.63
Symptoms	Abdominal pain		72	94.73
	Fever with chills and rigors		69	90.78
	Malaise/anorexia		66	86.84
	Nausea /vomiting		28	36.84
	Jaundice		6	7.89
	diarhhea		4	5.26
	dyspnea		1	1.31

Tbale no.1 shows the different clinical characteristics like demographic data, risk factors and clinical presentation. The mean age was 44.62 years, age ranging from 22 years to 58 years. Majority of them belonged to the age group between 41years to 50 years. 59.21% belonged to upper lower and lower class of socio-economic status and most of them (76.32%) were from rural areas. Amongst the risk factors studied, half of them (51.31%) had history of

alcoholism and 19.73% were known case of diabetes mellitus. Patients had multiple overlapping clical presentation, out of which 94.73% presented with pain in abdomen with or without radiating pain to shoulders. Abdominal pain, fever with chills, weight loss, malaise were most common presenting complaints.

Table no.2:- Distribution according to investigations.

Investigations			**Mean**	**Range**
laboratory	Hb		9.6	6.9-12.2
	TLC		13200	11000-24000
	PT INR		1.8	1-2.4
	Bilirubin		1.6	0.8-3.2
	AST		46	22-74
	ALT		48	26-76
	S.ALP		204	74-276
	Protein		5.2	4.9-6.6
Pus culture			Frequency	Percentage
	Amoebic		43	56.58
	Pyogenic		18	23.68
	Ameobic with secondary infection		4	5.27
	Indeterminate		11	14.47
Ultrasound	Side	Right	64	84.21
		Left	12	15.79
	Volume		Mean – 520.57	

Different investigations are described in table no.2, mean haemoglobin was 9.6g% and total leucocyte count of 13,200. The pus culture showed, 56.58% was ameobic liver abscess, 23.68% was pyogenic, 5.27% had ameobic with secondary infection (positive culture for pyogenic and amebic) and 14.47% had indeterminate report. On ultrasound examination, the abscesses were more common on the right (84.21%) with mean volume of abscess was 520.57cc ranging from 75cc to 800cc.

Table no.3:- Post procedural outcome.

Outcome- post procedure		**Mean**			
Mean time for clinical improvement		4.7 ± 1.4 days			
Time for reduction of abscess (atleast 50%)		5.2 ± 1.6 days			
Duration of drainage(days)		8.4 ± 4.2 days			
Total duration of hospital stay		11.6 ± 4.9 days			
Size of abscess (cc)		Pre-procedure	1st week	2nd week	3rd week
	mean	520.57	237.70	102.60	56.95
	Standard deviation	201.54	128.30	74.14	27.14
	T score	144.68	103.78	77.50	
Difference in size of abscess (cc)	**difference**	Pre procedure and 1st w		1st and 2nd w	2nd and 3rd w
	Mean	279.51		138.01	107.24
	Standard deviation	98.77		69.82	63.31
	Standard error	13.20		9.33	13.81
	t- score	21.17		14.79	1.7
	P value	0.00001		0.00001	0.00001
Complications	**Frequency**			**Percentage**	
Sepsis	0			0	
Peritonitis	0			0	
Bowel injury	0			0	
Failure to drain	0			0	
Catheter related	5			6.58	
haemorrhage	0			0	
pneumothorax	0			0	

haemothorax	0	0

Post procedural outcome is decribed in table no.3. Mean time for clinical improvement was 4.7 days, time for reduction of abscess size (50% and above) was 5.2 days. Duration of drainage required was 8.4 days and total duration of hospital stay was around 11.6 days. Size of abscess was was expressed in terma of means and standard deviation and t score by comparing it with size of previous week size of abscess. P value was calculated which was statistically significant and so does it show that with percutaneous drainage of abscess there was significant reduction in volume of abscess. Among the complications, 93.42% had no complications at all and only 6.58 had catheter related complications like blockage, catheter tip malposition who were managed conservatively and did not need re procedure.

Discussion:-

Our study showed that the maximum incidence of liver abscess was seen in males (85.33%) when compared to females. Amitesh Kumar Jha et al[5] study also showed incidence male at higher incidence (male: female= 112:13), Cristina et al[6]study showed, 56.9% were males and 47 patients 43.1% were females. A study conducted by Dulku et al[7] also showed increased incidence in males than females (Male: female=29:13). In Batham IK et al[3]study, there were 43 male and 7 female patients with liver abscess involved in the study. The male to female ratio was 6:1. The study conducted by Amitesh Kumar Jha et al[5], 81.82% belonged to lower socioeconomic class and our study also showed 59.21% belonged to upper lower and lower class of socio-economic status and most of them (76.32%) were from rural areas. In Batham IK et al[3]study, it was observed that pain in the right upper quadrant of the abdomen was the most common symptom, found in 92% of the cases.Cristina et al[6] study says, the majority of patients with presented with fever, 73%; right upper abdominal pain was reported in 69 cases (63.3%), vomiting and nausea in 31 (28.4%), while asthenia in 29 patients (26.6%), loss of weight in 19 patients (17.4%), and jaundice in 14 cases (12.8%). Our study also observed which 94.73% presented with pain in abdomen with or without radiating pain to shoulders. Dulku et al[7] study says abdominal pain, fever with chills, weight loss, malaise were most common presenting complaints. Fever (47.6 per cent), abdominal pain (40.0 per cent), and septic shock (28.6 per cent) were the three main clinical presentations documented at admission. Cristoph et al[8] study showed most common are fever and chills, followed by abdominal pain restricted to the right upper quadrant, and hepatic tenderness. Fever is a predominant symptom and has been reported in 90–95% of the cases. Amongst the risk factors, Cristina et al[6] study showed 23% had diabetes mellitus. Our study also showed, half of them (51.31%) had history of alcoholism and 19.73% were known case of diabetes mellitus. Whereas Amitesh Kumar Jha et al[5] study had 63.64% with alcoholism and 33.64% had history of diabetes.Dulku et al[7] study revealed 35.7% having diabetes, 42.9% had portal sepsis, 23.8% had underlying malignancy.

Cristina et al[6] study revealed the most common laboratory abnormality was increased C-reactive protein and fibrinogen blood levels, respectively, in 98% and 93.9% of cases. These were followed by abnormal total leucocytic count in 77% patients and elevated ALP in 67% of cases. In Amitesh Kumar Jha et al[5] study the laboratory revealed leukocytosis (75%), raised ESR (82%), and anemia (52%). The most marked LFT abnormality was raised alkaline phosphatase (62% cases). Abnormal prothrombin time was observed in 43% cases. Our study showed mean haemoglobin was 9.6g% and total leucocyte count of 13,200 where as Dulku et al[7] study showed 59.5% had leucocytosis, 57.1% had raised ALP, 28.6% had prolonged prothrombin time. It was observed that 39 of 50 patients (78%) had leukocytosis. Elevation of serum alkaline phosphatase was also observed in 76% of the patients in Batham IK et al[3] study. Anemia, leukocytosis, high erythrocyte sedimentation rate, elevated C-reactive protein level, hypoalbuminemia, and hyperbilirubinemia, as well as elevated alanine aminotransferase (ALAT) and alkaline phosphatase (AP) levels are the most common laboratory findings. None of the blood tests specifically help to diagnose LA; however, they can suggest a liver abnormality that leads to targeted imaging studies[8].

Cristina et al[6] study showed radiological drainage was the most frequent initial intervention: ultrasound or CT-guided needle aspiration of PLA was performed in 13 patients (11%) and percutaneous abscess drainage was performed on 72 patients (67%). Generally, a percutaneous French 7 pigtail catheter was inserted. The removal of the percutaneous drain was based on the patient's clinical and laboratory response. The median of drainage duration was 12.6 ±14 days. Of all 72 cases that underwent radiological drainage, 7 patients required surgical intervention because of failure of resolution and recurrence of the abscess. Endoscopic retrograde cholangiopancreatography (ERCP) was used to treat liver abscess in 6 patients (5.6%), in which there was a lithiasic or neoplastic biliary obstruction. In the study conducted by Amitesh Kumar Jha et al[5] of 110 patients, 15 patients were treated with medical or conservative treatment with a success rate of 70%, 37 patients were treated with percutaneous needle

aspiration with a success rate of 67%, 37 patients were treated with percutaneous catheter drainage and the success rate of this procedure was 100%, and 21 patients presented with features of peritonitis, were treated with surgical exploration and drainage. The success rate in this group was 65%. There were seven deaths in patients treated surgically. Dulku et al[7] study revealed more success rate in percutaneous aspiration more than that of percutaneous catheter drainage. In Batham IK et al[3] study, it was said that placement of an indwelling drainage catheter addresses all tissues as it provides continuous drainage, drains thick pus because of wider caliber catheter and prevents re-accumulation. This explains the higher success rates of PCD. The only reasons for failure of PCD as reported in some of the earlier series. have been either thick pus not amenable to percutaneous drainage (this can be overcome by placement of a wider bore catheter) or premature removal of drainage catheter. No recurrence occurred during the follow up period. However, both treatment modalities resulted in rapid clinical relief with most patients showing resolution of signs and symptoms within the first 3-4 days of the procedure[3]. The time required for 50% reduction in the cavity size is significantly less in the PCD compared to PNA(needle aspiration) group (4.9 days and 8.1 days respectively); It can be concluded that the abscess cavities showed faster collapse during the initial period in the PCD group but it did not have an advantage as far as total or near-total resolution of cavity is concerned[3]. Our study also showed 100% success rate (success rate in our study was considered when there was atleast 50% reduction in volume of abscess with clinical improvement. MA Abusedera et al[9] in his study showed that >50% Size reduction was achieved between 5–17 days with mean of 10.4, our study was even more significant because even >50% size reduction can be achieved in mean 5.2±1.6 days. In Cristina et al[6] study, there were 2 cases of major complication of interventional drainages: right pneumothorax, which resolved without drainage tube, and another patient developed biliary fistulae which resolved after ERCP decompression and nose-biliary drainage. In our study, 93.42% had no complications at all and only 6.58 had catheter related complications like blockage, catheter tip malposition who were managed conservatively and did not need re procedure.

Conclusion:-

Diagnosis is often delayed in liver abscesses due to vague clinical symptoms resulting in adverse outcomes. A multidisciplinary approach, the team including a gastroenterologist, radiologist, surgeon, and laboratory, is essential for successful treatment. Presently, with improvememts in imaging and interventional radiology, image-guided percutaneous treatment has replaced surgical intervention as the procedure of choice. Percutaneous catheter drainage of abscess is minimally invasive and also has higher success rate with earlier and better clinical and radiological improvement.

Conflict Of Interest
None.

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None.

References:-

1. Anita Dutta et al. Management of liver abscess. Medicine update 2012; volume 2.
2. Saini S. Imaging of the hepatobiliary tract. N Engl J Med 1997; 336:1889-94
3. Batham IK, Soni VK, Chandravanshi M. A prospective randomized comparison of ultrasound guided percutaneous catheter drainage and percutaneous needle aspiration for the treatment of liver abscess. J. Evolution Med. Dent. Sci.. 2016;5(13):597-603, DOI: 10.14260/jemds/2016/136
4. Singh JP, Kashyap A. A comparative evaluation of percutaneous catheter drainage for resistant amoebic liver abscesses. Am J Surg 1989;158:58–62.
5. Amitesh Kumar Jha et al; Clinicopathological study and management of liver abscess in a tertiary care center; Journal of Natural Science, Biology and Medicine;January 2015;Vol 6; Issue 1
6. Cristina Serraino et al. Characteristics and management of pyogenic liver abscess ; Medicine (2018) 97:19(e0628)
7. Dulku G, Mohan G, Samuelson S, Ferguson J, Tibballs J. Percutaneous aspiration versus catheter drainage of liver abscess: A retrospective review. AMJ 2015;8(1):7-18. http://dx.doi.org/10.4066/AMJ.2015.2240
8. Christoph Lübbert et al; Therapy of Liver Abscesses; Viszeralmedizin 2014;30:334–341 DOI: 10.1159/000366579
9. MA Abusedera, AM El-Badry; Percutaneous treatment of large pyogenic liver abscess; The Egyptian Journal of Radiology 2014.doi:10.1016/j.ejrnm.2013.11.005.