STUDY OF CLINICAL PATTERNS, MANAGEMENT AND OUTCOME OF LIVER ABSCESS IN A TERTIARY CARE HOSPITAL

Dissertation submitted in partial fulfillment of regulation for the award of M.S. Degree in General Surgery

(Branch I)

The Tamilnadu

Dr. M.G.R. Medical University, **Chennai**

MAY 2020

Coimbatore Medical College

Coimbatore - 641 014

Regd No. 221711307

CERTIFICATE

Certified that this is the bonafide dissertation done by **DR. IMKONGSUNGIT LONGKUMER** and submitted in partial fulfillment of the requirements for the Degree of M.S., General Surgery, Branch I of The Tamilnadu Dr. M.G.R. Medical University, Chennai.

Date: Unit Chief

Date: Professor &Head
Department of Surgery

Date: Dean
Coimbatore MedicalCollege
Coimbatore

DECLARATION

I, certainly declare that this dissertation titled, **"A STUDY OF CLINICAL PATTERNS, MANAGEMENT AND OUTCOME OF LIVER ABSCESS IN A TERTIARY CARE HOSPITAL**, the research are consistent with normal supervisory practice, and are acknowledged. I, also affirm that this bonafide work represent a genuine work of mine. The contribution of any supervisors to or part of this work was not submitted by me or any others for any award, degree or diploma to any other university board, neither in India or abroad. This is submitted to The Tamil Nadu Dr.MGR Medical University, Chennai in partial fulfillment of the rules and regulation for the award of Master of Surgery Degree Branch 1 (General Surgery).

Place : **Dr. IMKONGSUNGIT LONGKUMER**

Regd No. 221711307

Date :

INSTITUTIONAL HUMAN ETHICS COMMITTEE
COIMBATORE MEDICAL COLLEGE, COIMBATOR – 14

EC Reg No. ECR/892/Inst/TN/2016
Telephone No: 0422 – 2574375/76
Fax : 0422 – 2574377

CERTIFICATE OF APPROVAL

To
Dr.Imkongsungit Longkuner
Post Graduate,
Department of General Surgery,
Coimbatore Medical College & Hospital
Coimbatore -18.

Dear **Dr.Imkongsungit Longkuner**

The Institutional Ethics Committee of Coimbatore Medical College, reviewed and discussed your application for approval of the proposal entitled **"A Study of Clinical patterns management and outcome of liver abscess in Tertiary Care Hospital."**No.0106/2017.

The following members of Ethics Committee were present in the meeting held on 30.11.2017.conducted at MM - II Seminar Hall, Coimbatore Medical College Hospital Coimbatore-18

1	Dr.S.Ramalingam MD, Dean, PSG IMS&R, Cbe	Chairman
2	Dr.Usha MD., Professor of General Medicine, CMCH, Cbe	Member Secretary
3	Dr.R.Manonmani MD., Professor of O&G, CMCH, Cbe	Clinicians
4	Dr.N.Renganathan MS., Professor of General Surgery, CMCH,Cbe	Clinicians
5	Dr.Sudha Ramalingam MD., Professor of SPM, PSG IMS&R, Cbe	Clinicians
6	Dr.R. Shanmugavadivu MD., Professor of Physiology, CMC, Cbe	Basic Medical Scientist
7	Dr.N. Shanthi MD., Professor of Pharmacology, CMC, Cbe	Basic Medical Scientist
8	Dr.A.Dhanalakshmi MD., Assoc. Professor of Pathology, CMC,Cbe	Basic Medical Scientist
9	Dr.L.Madhan MD., Professor of Pharmacology, CMC, Cbe	Basic Medical Scientist
10	Dr.N.Paramasivan MD., Professor of Pharmacology, Sri Ramakrishna Dental College, Coimbatore	Basic Medical Scientist
11	Mrs.A.Sharmila BA., BL., Advocate	Legal Expert
12	Dr.K.P.Sampath Kumar M.Pharm, Ph.D., Asst. Prof. of Pharmacy, CMC, Cbe	Scientific Member
13	Dr.G.Vani Ganesh M.Sc.,Ph.D., Tutor in Medical Surgical Nursing, CMCH, Cbe	Scientific Member
14	Mr.V. Balasubramani MA,MA,MBA,LLB,M.Phil,PG.D.M, DLLAL, Chief Executive, Avinashilingam JSS Self Finance Courses, Cbe	Social Worker
15	Mr.V.A.Shahul Hameed, +2	Lay-Person

We approve the Proposal to be conducted in its presented form.

Sd/Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL HUMAN ETHICS COMMITTE
COIMBATORE MEDICAL COLLEGE
COIMBATORE - 641 014.

ACKNOWLEDGEMENT

I express my gratitude to **Dr. B. ASOKAN, Dean** of Coimbatore Medical College Hospital for providing facilities to carry out this project work successfully.

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I would also like to thank the **Supporting Staff** of Department of Surgery and **Anesthesiology.**

I extend my heartfelt thanks to all the **patients** who co-operated for this study.

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Study Volunteer ID:

Study Volunteer Name:

Coimbatore Medical College, Coimbatore – 641014

Institutional Human Ethics Committee

INFORMED CONSENT FORMAT FOR RESEARCH PROJECTS

(strike off items that are not applicable)

I Dr Imkongsungit Longkumer, am carrying out a study on the topic "A STUDY OF CLINICAL PATTERNS, MANAGEMENT AND OUTCOME OF LIVER ABSCESS IN A TERTIARY CARE HOSPITAL" as part of my research project being carried out under the aegis of the Department of General Surgery, Coimbatore Medical College and Hospital. My research guide is Professor Dr. T. SRINIVASAN MS, Chief of unit S3, Dept. of General Surgery, Coimbatore medical college and Hospital

The justification for this study is: Liver abscess remains an important clinical problem with a significant mortality rate in both developing and developed countries. It could result as a complication of various intra-abdominal infections; by hematogenous spread via portal vein from the gastrointestinal tract; or, may develop after traumatic injury to the liver. This study is aimed to describe the clinical patterns of the disease, the management and the outcome of liver abscess that were admitted in CMCH for a period of one year.

The objective of this study is: To describe the etiology, clinical presentation, management and outcome of liver abscess in adult patients.

Study volunteers / participants are : Liver abscess patients above 18yrs of age.

Location: Department of General surgery, Coimbatore medical college and Hospital

We request you to kindly cooperate with us in this study. We propose to collect background information and other relevant details related to this study. We will be carrying out an **Initial interview** of 10 minutes. Data collected will be stored for a period of one and half years. We will not use the data as part of another study. A complete clinical examination will be done including visual inspection, palpation, percussion and auscultation of abdomen. Blood sample of 5 ml will be collected at one time to test the complete counts of blood along with liver, lipid and renal profiles both for routine and research study purpose. The blood sample collected at the time of study will not be sold or shared with persons from another institution.

Benefits of the study: This study will help in understanding the outcome of liver abscess.

Risks involved by participating in this study: Complications related to liver abscess.

If you are uncomfortable in answering any of our questions during the course of the interview/study, **you have the right to withdraw from the interview/study at anytime.** You have the freedom to withdraw from the study at any point of time. Kindly be assured that your refusal to participate or withdrawal at any stage, if you so decide, will not result in any form of compromise or discrimination in the services offered nor

would it attract any penalty. You will continue to have access to the regular services offered to a patient. You will **NOT** be paid any remuneration for the time you spend with us for this interview/study. The information provided by you will be kept in strict confidence. Under no circumstances shall be used for approved research purpose only. You will be informed about any significant new findings – including adverse events, if any, - whether directly related to you or to other participants of this study, developed during the course of this research which may relate to your willingness to continue participation.

Consent: The above information regarding the study, has been read by me/ read to me, and has been explained to me by the investigator/s. Having understood the same, I hereby give my consent to them to interview me. I am affixing my signature/left thumb impression to indicate my consent and willingness to participate in this study (i.e., willingly abide by the project requirements).

Signature/Left thumb impression of the Study Volunteer/Legal Representative

Signature of the Interviewer with date:

Witness:

Contact number of PI:

Contact number of Ethics Committee Office:

URKUND

Urkund Analysis Result

Analysed Document:	IMKONG LIVER ABSCESS THESIS.docx (D57276109)
Submitted:	10/19/2019 9:37:00 AM
Submitted By:	Imkonglkr0077@gmail.com
Significance:	14 %

INTRODUCTION

Liver abscess is a major health issue in a developing country like India where, due to its tropical climate and also unrestrained consumption of alcohol, which is a risk factor for the development of liver abscess, the prevalence of the disease has been constant over the years.

The liver usually manages to handle exposure to low levels of bacteria due to the presence of reticuloendothelial system. The development of liver abscess occurs when an inoculum of bacteria regardless of the route of exposure exceeds the livers ability to clear it. It could be due to infections of the biliary tree, portal vein, hepatic artery or direct invasion of a nearby invasion of a nearby infection like appendicitis, peritonitis etc. Liver abscess is basically collection of purulent material in the parenchyma of liver. Globally two common sources of infection i.e. bacterial (Pyogenic) and Entamoeba Histolytica (amoebic) has been identified and described elaborately.

Anatomically, Liver abscess usually involves the right lobe. Symptoms associated may range from fever, nausea, vomiting, anorexia and jaundice. Pain in right hypochondrium is a late feature. Diagnostic modalities has improved drastically over the years with ultrasonography, CT scan etc which has in turn improved the treatment of patients with

either antimicrobial drugs and drainage of the abscess depending on the severity of the disease. For drainage, though usually ultrasound guided percutaneous aspiration or catheter drainage is preferred, certain conditions indicates the need for open surgical drainage, which unfortunately has a higher morbidity and mortality.

This study tries to evaluate the etiology of the disease, the clinical features, the diagnostic modalities and management outcomes of patients with liver abscess.

AIMS AND OBJECTIVES

To describe the etiology, clinical presentation, management and outcome of liver abscess patients in a tertiary care hospital.

REVIEW OF LITERATURE

The understanding of liver dates back to 2000BC where the ancient Babylonians described the surface anatomy of liver. As such the understanding of the development , anatomy and normal functioning of the liver is a prerequisite before a thorough study of the liver pathology can be concluded.

EMBRYOLOGY:

The liver develops from a common progenitor along with the biliary tree and pancreas. During embryogenesis, the liver primordium begins to form in the third week of development as an outgrowth of endodermal epithelium, known as hepatic diverticulum or liver bud. The connection between the hepatic diverticulum and the future duodenum narrows to form the bile duct, and an outpouching of the bile duct forms into the gallbladder and cystic duct. Hepatic cells develop cords and intermingle with the vitelline and umbilical veins to form hepatic sinusoids. The mesoderm of the septum transversum gives rise to the hematopoietic cells, Kupffer cells, and connective tissue and it also connects the liver to the ventral abdominal wall and foregut.

In fetal circulation, the liver plays a crucial role as such the vitelline veins transports blood from the yolk sac to the sinus venosus and

ultimately form a network of veins around the foregut (future duodenum) that drain into the developing hepatic sinusoids. These vitelline veins eventually fuse and give rise to the portal, superior mesenteric, and splenic veins. The sinus venosus becomes the hepatocardiac channel and then finally forms the hepatic veins and retrohepatic IVC. The umbilical Vein carry oxygenated blood to the fetus, Initially, the umbilical veins drain into the hepatic sinusoids, which previously drained into the sinus venosus, until week 5 of development. The right umbilical vein disappears, and the left umbilical vein later drains directly into the hepatocardiac channel, bypassing the hepatic sinusoids through the ductus venosus. The ligamentum teres is formed from the remnant of the left umbilical vein in the adult liver, which runs in the falciform ligament into the umbilical fissure, and the ligamentum venosum is formed from the remnant of the ductus venosus, at the termination of the lesser omentum under the left liver.[1]

ANATOMY

The normal adult liver is a large, wedge-shaped organ that occupies much of the right upper quadrant of the abdomen. Most of the liver bulk lays to the right of the midline where it molds to the undersurface of the right diaphragm, and where the lower border

coincides with the right costal margin.[2] It is reddish brown and is surrounded by a fibrous sheath known as the Glisson's capsule.

The liver is held in place by various ligaments which includes the remnant of the obliterated umbilical vein known as the round ligament, the falciform ligament which separates the left lateral and left medial segments along the umbilical fissure and anchors the liver to the anterior abdominal wall. The right and the left triangular ligaments secure thetwo sides of the liver to the diaphragm. The liver is anchored to the right retroperitoneum via the right coronary ligament. Centrally the liver attaches via thehepatoduodenal (porta hepatis) and the gastrohepatic ligaments. The porta hepatis contains the portal vein, common bile duct and the hepatic artery.[3]

Based on morphology and surface marking, the liver can be divided into the right and the left halves by creating a plane through the gall bladder fossa (Cantlie line) and Inferior Vena Cava. The left halve of the liver can be further subdivided into the left medial section and the left lateral section based on the umbilical fissure and falciform ligament. The right halve is subdivided into the right anterior and right posterior segment.[2] Totally the whole of the liver is subdivided into eight segments by Couinaud, which is numbered in a clockwise manner. Each segment is supplied by the portal triad which includes the hepatic artery, portal vein and the bile duct.

RIGHT LIVER: It is larger which accounts for about 60% to 70% of total liver mass.[3] It contributes to all the surface of the liver. It includes anterior segments, i.e. segment V, VIII of the liver, and the posterior segments, which are segments VI and VII. The anterior and posterior segments are divided by the right scissura.

LEFT LIVER: Its smaller compared to the right liver and is further subdivided into three segments. Its anterior segment includes the segment III and IV and the posterior segment contains only segment II. Segments II and III comprise the left lateral segment and segment IV includes the left medial segment. The umbilical fissure, which is visible, is found on the inferior surface of left liver and ligamentum teres runs into this fissure. Segment IV is further subdivided into IVA, which is cephalad and just below the diaphragm, and IVB, which is caudad and adjacent to the gall bladder fossa.

Segment I, also known as the caudate lobe lies in the dorsal aspect of the liver. Its relations include the left and the middle hepatic veins on its superior aspect, IVC on its posterior surface and it lies inferiorly to the left portal triad. It receives blood supply and biliary drainage from both the right and the left portal vein and hepatic artery.

SURFACES AND BORDERS OF LIVER:

The liver has got five surfaces and a single border. The surfaces include anterior, posterior, superior, inferior and right surface. Amongst these the inferior surface is well defined as it is demarcated by a prominent inferior border. The other surfaces are continuous with each other.

INFERIOR BORDER: It separates the anterior surface from the inferior surface. It is sharp anteriorly and rounded laterally where it separates the right surface from the inferior surface.

ANTERIOR SURFACE: It is triangular and slightly convex in shape. It is related to the xiphoid process and the anterior abdominal wall in the median plane and on each side to the diaphragm. The falciform ligament is attached, a little to the right of the median plane.

POSTERIOR SURFACE: It is triangular in shape and has a deep concavity for the vertebral columns in its middle part. The bare area, groove for the inferior vena cava, the caudate lobe and fissure for the ligamentum venosum is present on this surface.

SUPERIOR SURFACE: It is quadrilateral in shape and has a concavity in the middle due to the cardiac impression. The either side of the impression is convex to accommodate the dome of diaphragm.

INFERIOR SURFACE: It is also quadrilateral in shape and is directed downwards, backwards and to the left. It has impressions for neighboring viscera like gastric impression, which is a large concave impression on the inferior surface of left liver; a fissure for ligamentum teres which passes from the inferior border to the left end of the porta hepatis; the quadrate lobe; the fossa for the gall bladder, which lies right of the quadrate lobe and colic impressions, which lies to the right of gallbladder fossa.

RIGHT SURFACE: It is convex and quadrilateral in shape. It is related to the diaphragm opposite to the 7^{th} and 11^{th} ribs in the mid axillary line. The lower one-third of the surface is related to the diaphragm alone, the middle one-third to the diaphragm and the costodiaphragmatic recess and the upper one-third to the diaphragm, the pleura and the lung.

PORTAL VEIN:

It is responsible for about 75% of total hepatic blood inflow and it lacks valves which provides a medium for high blood flow at low pressure.[1] It is formed by the confluence of the superior mesenteric vein and the splenic vein. It runs cephalad and passes through the porta hepatis before dividing into the left and the right portal veins. The right portal vein has a short, oblique and extrahepatic course which gives off anterior branch which supplies segment V and VIII and the posterior branch which supplies segment VI and VII. The left portal vein has a

longer and transverse course along the base of segment IV and courses into the umbilical fissure giving off branches to segment II and III of the left lateral segment and segment IV of the left medial segment. The portal venous system has got less variation as compared to biliary, ductal and the hepatic arterial systems but about 20% - 35% do show some sort of aberrant portal venous anatomy. The splanchnic venous blood from the stomach, pancreas, spleen, small intestine and majority of the colon are drained to the liver via the portal veins before returning to the systemic circulation. The pressure inside the portal venous system in a normal human adult is about 3 to 5mmHg. During portal hypertension, it may rise upto 20to 30mmHg which results in decompression of the systemic circulation through portocaval anastomosis, mostly via the coronary (left gastric) vein, which produces esophageal and gastric varices leading to major hemorrhage.

HEPATIC ARTERY:

The hepatic artery is responsible for about 50% of liver's oxygenation despite carrying about 25% - 30% of total blood flow. The hepatic arterial system has got multiple variations and the most common variation is found in about 60% of the total population. It arises from the celiac axis (trunk) and gives off the left gastric, splenic and common hepatic arteries. The common hepatic artery is then divided into the

hepatic artery proper and the gastroduodenal artery. The hepatic artery proper then gives off the right and the left hepatic branch. In about 10% - 15% of cases, there is an accessory right hepatic artery arising from the superior mesenteric artery (SMA). This vessel runs posterior to the portal vein and then takes up the right lateral position before entering into the liver parenchyma. In approximately 3% - 10% of the cases there is an accessory left hepatic artery which branches off the left gastric artery and runs obliquely in the gastrohepatic ligament anterior to the caudate lobe before entering the hilar plate at the base of the umbilical fissure. Very rarely (1% - 2%) both accessory or replacement right and left hepatic arteries maybe present.

HEPATIC VEINS AND INFERIOR VENA CAVA:

The venous blood in the liver is drained by three major hepatic veins which include the right, middle and left hepatic veins which drains into the suprahepatic inferior vena cava (IVC) and ultimately into the right atrium. The right hepatic artery drains segment V, VI, VII & VIII; the middle hepatic vein drains segment IV, V & VIII; and the left hepatic vein drains segment II & III.

The caudate lobe is the only segment which drains directly into the IVC. In 95% of cases, the left and the middle hepatic veins combine to form a common trunk which drains into the IVC. In 15% to 20% of cases, there is a large inferior accessory right hepatic vein that runs in the

hepatocaval ligament and is a source of torrential bleeding during right hepatectomy.

BILE DUCT AND HEPATIC DUCTS:

The common bile duct lies anteriorly and to the right within the hepatoduodenal ligament, thereafter it gives off the cystic duct and continues as the common hepatic duct which then divides into the right and the left hepatic ducts. The terminal part of the hepatic ducts i.e. the intrahepatic bile ducts, invaginates the Glisson capsule at the hilum along with their corresponding portal vein and hepatic artery branches, together forming the peritoneal covered portal triads known as the portal pedicles. The left hepatic duct has a longer extrahepatic course before giving off the terminal branches, which then drains segment II, III and IV. The right hepatic duct divides into the anterior and the posterior hepatic ducts. The right anterior hepatic duct drains segment V and VIII and the right posterior hepatic duct drains segment VI and VII. The Caudate lobe has its own ductal drainage system with multiple small ducts joining the bifurcation and proximal aspect of both the hepatic ducts. There are variations in the biliary tree with about 30% - 40% having a nonstandard hepatic duct confluence with accessory or aberrant ducts. In about 15% of individuals, the drainage of caudate lobe is through the left lobe and in about 5% of individuals via the right hepatic duct. In the distal aspect of common bile duct, the main pancreatic duct (of Wirsung) joins with it

and enters the second part of duodenum, with or without a common channel.

GALLBLADDER:

It is a reservoir of bile that lies against the inferior surface of segment IV and V of liver. Most of the gallbladder is covered by a peritoneal layer except for the part that is adherent to the liver. The gallbladder consists of a fundus, a body and an infundibulum. It shows certain variation in size but is usually 10cm in length and about 3-5cm in width.

NERVES:

The sympathetic fibers arising from T7 through T10 supplies the liver and the biliary tree. The parasympathetic innervations of the liver comes from the Vagus nerve, which gives off anterior hepatic branch from the left vagus and the posterior hepatic branch from the right vagus. The sympathetic fibers before giving off post ganglionic fibers to liver and bile ducts, goes through the celiac axis. Though the functions of these nerves is poorly understood, in acute distension of liver, and hence the liver capsule, can cause in referred pain to the right shoulder due to innervations via the right phrenic nerve.[3]

LYMPHATIC DRAINAGE:

In the liver, most of the bile drainage is to the hepatoduodenal ligament. Then the lymphatic drainage continues along the hepatic artery to the celiac lymph nodes and then to the cysterna chili. Also, the lymphatic drainage can follow along the hepatic veins to lymph nodes in the area of suprahepatic IVC and through the diaphragmatic hiatus.[1]

FUNCTIONAL ANATOMY OF LIVER:

The functional unit of the liver is known as a lobule or an acinus. It is made up of a central terminal hepatic venule surrounded by four to six terminal portal triads that form a polygonal unit. Hepatocytes are arranged in one cell thick plates, surrounded on each side by endothelium-lined and blood-filled sinusoids, in between the terminal portal triads and the central hepatic venule. The blood flows via the terminal portal triad, through the sinusoids to the terminal hepatic venule.

The hepatocytes form the bile which empties into the terminal canaliculi and then forms on the lateral walls of the intercellular hepatocyte. The functional unit forms a structural basis for many of the metabolic and secretory functions of liver.

There are three zones between the terminal portal triad and central hepatic venule, that differ in their enzymatic makeup as well as exposure to nutrients and oxygenated blood. In general, zone1 through zone 3 splay out from the terminal portal triad towards the central hepatic

venule. Zone 1 (periportal zone) is rich in nutrients and oxygen, while zone 2 (intermediate zone) and zone 3 (perivenular zone) are comparatively poorer in nutrient and oxygen. The cells of the different zones differ enzymatically and therefore respond differently to toxin exposure and hypoxia. This anatomic arrangement is responsible for the phenomenon of centrilobular necrosis from hypotension as zone 3 is the most susceptible to decreases in oxygen delivery.

HEPATIC MICROCIRCULATION

The hepatic sinusoids are supplied by the terminal portal venous and the hepatic arterial branches directly. The arterial branches is responsible for pulsatile but low-volume flow that enhances flow in the sinusoids whereas the portal venous branches supplies minimal but constant flow.Blood within the sinusoids empties directly into terminal hepatic venules at the center of a functional lobule and this process results in the unidirectional flow of blood in the liver from zone 1 to zone 3. The sinusoidal endothelial cells are separated from hepatocytes by the space of Disse (perisinusoidal space) with the space being an extravascular fluid compartment into which hepatocytes project microvilli, therefore allowing proteins and other plasma components from the sinusoids to be taken up by the hepatocytes. Multiple large fenestrations are present within this space which allows for the maximal contact of hepatocyte membranes with this extravascular fluid

compartment and blood in the sinusoidal space. Therefore, this system allows bidirectional movement of solutes (high and low molecular weight substances) into and out of hepatocytes, providing tremendous potential for filtration. But, the fenestrations of the endothelial cells restrict the movement of molecules between the hepatocytes and sinusoids and vary in response to exogenous and endogenous mediators.

Other types of cells are also found like Kupffer cells which are phagocytic, derived from the macrophage –monocyte system, which can migrate along sinusoids to areas of injury and play a role in initiating inflammatory response and in trapping of foreign substances. Other lymphoid cells found in hepatic parenchyma includes natural killer, natural killer T, CD4 T, and CD8 T cells which provides the liver with an innate immune system.[1]

HEPATOCYTES

These are complex multifunctional cells making up about 60% of the hepatic cellular mass and about 80% of the cytoplasmic mass of the liver. The function of these cells includes uptake, storage, and release of nutrients; synthesis of lipids, glucose, fatty acids and numerous plasma proteins (including C-reactive protein and albumin); production and secretion of bile for digestion of dietary fats; and degradation and detoxification of toxins. The hepatocyte is one of the most diverse and metabolically active cells in the body. In each hepatocyte, there are about

1000 mitochondria, which occupies about 20% of the cells. These mitochondria provide energy for metabolic needs and also are essential for fatty acid oxidation. Hepatocyte also contains golgi apparatus whose functions include synthesis of structural and secreted proteins; production and metabolism of cholesterol; glycosylation of secretory proteins;metabolism of lipids and glucose; bile formation and secretion; and drug metabolism. Lysosomes, which are intracellular single membrane vesicles that contain a number of enzymes, are also present in hepatocyte. They store and degrade the exogenous and endogenous substance.[1]

LIVER PHYSIOLOGY

Liver has a spectrum of functions which includes storage, metabolism, production and secretion. The processing of absorbed nutrients through the metabolism of glucose lipids and proteins is among its crucial functions. Liver plays an important role in maintaining the glucose concentration within normal levels. In the fasting state, the liver ensure a sufficient supply of glucose to the central nervous system. Via glycogenolysis, the liver can produce glucose by breaking down glycogen through glycogenolysis. And through gluconeogenesis, synthesis of glucose from noncarbohydrate precursors such as lactate, amino acids and

glycerol takes place. In postprandial state, by glycolysis and lipogenesis, the liver removes the excess circulating glucose. Liver also plays a central role in lipid metabolism through the formation of bile and the production of fatty acids and cholesterol. Through amino acid deamination, protein metabolism takes place in the liver which results in production of ammonia as well as production of variety of amino acids.

The liver is also responsible for the synthesis of plasma proteins which includes albumin, fibrinolytic systems, factors of coagulation and compounds of the complement cascade. In addition, the detoxification of drug occurs in the liver along with the immunologic responses through the many immune cells found in its reticuloendothelial system.[3]

BILIRUBIN METABOLISM:

Bilirubin is the breakdown product of normal heme catabolism and is bound to albumin in the circulation which is sent to the liver. It is conjugated to glucuronic acid in the liver to form the bilirubin diglucuronide in a reaction that is catalyzed by the enzyme glucuronyl transferase which makes it water soluble. This glucuronide is then excreted into the bile canaliculi from which a small amount dissolves in the blood and is then excreted in the urine. Most of the conjugated bilirubin is then excreted in the intestine as waste because the intestinal mucosa is relatively impermeable to conjugated bilirubin. Some of the

bilirubin and urobilinogens are reabsorbed in the portal circulation as the intestinal mucosa is permeable to unconjugated bilirubin and urobilinogens, which are a series of bilirubin derivatives formed by the action of bacteria.[3]

FORMATION OF BILE:

Bile is a complex fluid containing both organic and inorganic substances which are dissolved in an alkaline solution that flows from the liver through the biliary system and into the small intestine. Bile is produced by hepatocytes and secreted through the biliary system. Its components include electrolytes, water and a variety of organic molecules

which includes bile salts, phospholipids, bile pigments and cholesterol.

Bile is stored and concentrated in the gallbladder in between meals through the absorption of water and electrolytes. When food enters the duodenum bile is released from the gallbladder which aids in the digestion. About 1L of bile is produced daily by the human liver.

The digestion and absorption of lipids in the small intestine occurs via the action of bile salts in conjunction with phospholipids. The bile acids are derivatives of cholesterol which are synthesized in hepatocytes. Cholesterol is converted into bile acids, cholic acid and

chenodeoxycholic acid.

These bile acids are then conjugated to form either glycine or taurine before it is secreted into the biliary system. Bile salts that are secreted into the intestines are efficiently reabsorbed and reused. About 90% - 95% of the bile salts are absorbed from the small intestine at the terminal ileum and the remaining 5% - 10% enter the colon and are converted to secondary salts, deoxycholic acid and lithocholic acid. The primary and secondary bile salts and bile acids are mixed and is primarily absorbed by active transport in the terminal ileum. The absorbed bile salts are then transported back into the liver in the portal vein and re-excreted in bile. This continuous process of secretion of bile salts in the bile, their passage through the intestine and their subsequent return to the liver is termed as the enterohepatic circulation.

DRUG METABOLISM:

The lipid soluble drugs are eliminated by the liver by transforming them into more readily excreted hydrophilic products. For drug metabolism, two main reactions includes phase I and phase II. In phase I reactions, oxidation, reduction and hydrolysis of molecules takes place. These reactions converts the original chemicals into more hydrophilic metabolites.

Cytochrome P450 is important for oxidative reactions involving drugs and toxic substances. In Phase II reactions, which are also known

as conjugation reactions, synthetic reactions takes place which involve the addition of subgroups to the drug molecule. These subgroups include acetate, glycine, glucuronate, glutathione, sulfate and methyl groups. These drug reactions occur mainly in the smooth endoplasmic reticulum of hepatocytes. In some drugs, the metabolism of liver converts it into their active products (Acetaminophen in large doses, the normal metabolic pathways are overwhelmed and some of the drug is converted to reactive and toxic intermediate by the Cytochrome P450 system).[3]

INFECTIONS OF THE LIVER:

The liver is able to handle the continuous low level exposure to the enteric bacteria that it receives through the portal venous system as it contains the largest portion of the reticuloendothelial system in the human

body. When the bacterial load, regardless of the route of exposure,

xceeds the liver's ability to clear it, it will give rise to liver abscess.

PYOGENIC LIVER ABSCESS:

Pyogenic liver abscess are more common in developed countries as compared to amoebic liver abscess. They can be single or multiple and are more frequently found in the right liver (about 75%) due to preferential laminar blood flow to the right side.[1] The abscess cavities varies in size and in multiple liver abscess, it may coalesce to give a honeycomb appearance. In about 40% of abscesses, the causative

organisms are monomicrobial, another 40% are polymicrobial and the rest 20% are culture negative. They are more commonly seen in 50 - 60 years age group.

The routes of hepatic exposure to bacteria are multiple and includes the biliary tree, hepatic artery, portal vein, direct extension of a nearby nidus of infection, and trauma. Previously pyogenic liver abscess often resulted from infections of the intestinal tract such as acute appendicitis and diverticulitis which then, via the portal circulation, spread to the liver. But recently with improved imaging modalities and earlier diagnosis of these intra-abdominal infections, this particular etiology has become less common. There is an increasing trend of incidence due to infections by opportunistic organisms in immunosuppressed individuals including patients with acquired immunodeficiency virus (AIDS), transplant and chemotherapy patients.

In infections via the biliary tree, the process of infection is described as ascending suppurative cholangitis. Here, biliary obstruction, due to stone disease or malignant disease, results in bile stasis with the potential for subsequent bacterial colonization, infection, and ascension into the liver. In Asian countries, intrahepatic stones and cholangitis (recurrent pyogenic cholangitis) are common causes, whereas in the Western countries, malignant obstruction are more commonly found.

Other factors with increased risk include Caroli disease, biliary ascariasis, and biliary tract surgery, as they all cause obstruction of biliary tree and accumulation of bacteria.

In the portal venous system, any infectious disorder of the gastrointestinal tract can result in ascending portal venous infection (pyelophlebitis) as the portal veins drains the gastrointestinal system. The most common causes of pyelophlebitis are appendicitis, diverticulitis, pancreatitis, pelvic inflammatory disease, inflammatory bowel disease, perforated viscus, and omphalitis in the newborn.

In infections of the liver through the hepatic arterial route, any systemic infection (e.g., endocarditis, osteomyelitis, pneumonia) can result in bacteremia and infection of the liver.

Hepatic abscess may also occur as a result of direct extension of an infectious process. Common examples of direct extension include suppurative cholecystitis, perinephric abscess, subphrenic abscess and perforation of the bowel directly into the liver.

Trauma causing hepatic abscess includes penetrating and blunt trauma, which causes an intrahepatic hematoma or an area of necrotic liver, which can subsequently develop into an abscess. Hepatic abscess

due to trauma can also manifested about several weeks after injury in delayed cases.

Cryptogenic pyogenic abscess are found in many cases and maybe possible due to resolved infectious process at the time of presentation, undiagnosed abdominal disease and host factors such as diabetes or malignant disease rendering the liver more susceptible to transient hepatic artery or portal vein bacteremia. In such patients, thorough history with detailed clinical examination and with laboratory investigations for abnormalities in the biliary tree or intestinal tract should be undertaken.

PATHOLOGY AND MICROBIOLOGY

Involvement of right liver (75%) is more common followed by the left liver (20%) and then the caudate lobe (5%) which is rarely involved. In approximately 50% of the cases, liver abscess are solitary.

Bilobar involvement with multiple abscesses is uncommon. Abscesses from pyelophlebitis or cholangitis are usually polymicrobial, with a high preponderance of gram-negative bacilli. Systemic infections, on the other hand, predominantly cause infection with a single organism. The most common organisms responsible for pyogenic liver abscess are

gram negative with Escherichia coli being the most common worldwide.[3] Other common organisms include Streptococcus faecalis,Klebsiella and Proteus vulgaris. Anaerobic organisms like Bacteroides fragilis are also seen frequently. In patients with foreign materials like infected indwelling catheters and with endocarditis, Staphylococcus and Streptococcus species are more important.

CLINICAL FEATURES

In hepatic abscess, patient presents with classical features of fever, jaundice and right upper quadrant pain with tenderness to palpation in about 10% of the cases. The most common presenting symptoms include fever, chills and abdominal pain. Jaundice is present in about one third of the affected patients. Patient may also present with a wide array of non specific symptoms like vomiting, malaise, anorexia, night sweats, diarrhea with involvement of diaphragm leading to cough or dyspnoea. In rare cases, patients may present with peritonitis secondary to rupture. Cases of rupture into the pleural space or pericardium have been reported but are highly uncommon. The duration of symptoms vary in relation to chronicity of disease. In acute, it is usually associated with identifiable abdominal disease, whereas in chronic presentation it is often associated with a cryptogenic abscess. There is a rare complication that is endogenous endophthalmitis, which is specific to Klebsiella hepatic abscess and occurs in approximately 3% of cases. It is more common in

diabetics and best chance to preserve visual function is with early diagnosis and treatment.

On Physical examination, the most common findings are fever and right upper quadrant tenderness (40% - 70%). Jaundice is also found in about 25% - 30% of cases and hepatomegaly in about 50% of cases.

INVESTIGATIONS

In pyogenic liver abscess, non specific abnormalities of blood test are commonly seen. Leucocytosis and anemia are commonly encountered. The LFT of the patients are also generally deranged. The ALP is elevated in about 80% of patients and total bilirubin in about 30% - 50% of the patients. In about 60% of patients, transaminases are mildly elevated.

Hypoalbuminemia or mild elevations of the PT and INR can be present and reflect a degree of chronicity. These blood investigations are not specific for liver abscess but suggest the possibility of liver pathology.

Radiological imaging studies are the most important component in coming to a diagnosis of liver abscess. In Chest radiographs, the findings are abnormal in about 50% of the time and shows subdiaphragmatic disease, such as an elevated right hemidiaphragm, right pleural effusion, or atelectasis. Occasionally, there can be left-sided findings in the case of

an abscess involving the left liver. Abdominal radiographs in rare cases may show air fluid levels or portal venous gas.

Ultrasound and CT are the mainstays of diagnostic modalities for hepatic abscess. Ultrasound examination of the liver will show pyogenic abscess as round or oval hypoechoic lesions with well defined border and a variable number of internal echoes. They can distinguish between cystic

and solid lesions. The limitations of ultrasound are that they are unable to visualize lesions high up in the dome of the liver and that it is a user-dependent modality. In diagnosing a patient with liver abscess, the sensitivity of USG is about 80% - 95%. CT scan is highly sensitive (95% - 100%) in diagnosing liver abscess. CT scan shows similar findings to USG, with pyogenic liver abscess showing appearing as hypodense with peripheral enhancement and may contain air fluid levels indicating a gas producing infectious organism. High-quality CT scans can help demonstrate very small abscesses and also can more easily identify multiple small abscesses. MRI has got no distinct advantage over USG and CT and hence not preferred. It can be helpful in distinguishing the cause of many hepatic masses and evaluating the biliary tree for pathologic changes.

DIFFERENTIAL DIAGNOSIS

Its important to differentiate pyogenic liver abscess from other cystic infections like amoebic or echinococcal cyst because of the difference in treatment protocol. Echinococcal (Hydatid) cyst can be diagnosed with characteristic radiological findings but its difficult to differentiate between pyogenic and amoebic liver abscess as the clinical presentation is similar in both.

TREATMENT

Before the advent of antibiotics, routine drainage was done which was almost always fatal. But now, the current cornerstone of treatment include broad spectrum IV antibiotics which should be continued for 2 weeks or more and correction of the underlying cause. Percutaneous needle aspiration and culture of the aspirate may be helpful in guiding the choice of antibiotics. Until cultures have specifically identified the offending organisms, broad-spectrum antibiotics covering gram-negative, gram-positive, and anaerobic organisms should be used. Combinations such as ampicillin, an aminoglycoside, and metronidazole or a third-generation cephalosporin with metronidazole are appropriate.

Percutaneous drainage for liver abscess was first described in 1953 but was widely accepted only until 1980s.[1] During the last 25 years, with

the development of high-quality imaging and expertise in interventional radiologic technique, percutaneous catheter drainage has become the treatment of choice for most patients with success rate ranging from 66% -

90%. The advantages include simplicity of treatment and avoidance of general anesthesia and a laparotomy. Certain contraindications to the use of percutaneous drainage include the presence of ascites, coagulopathy, and proximity to vital structures. In multiple liver abscess, the failure rate is higher but its success rate is high enough (as shown by studies) that warrants the use of percutaneous aspiration as the first line of management. Most patients require more than one aspiration and about 20% of patients require three or more aspirations. Placement of a percutaneous drainage catheter is beneficial only for a minority of patients, as most pyogenic abscess arequite viscous and catheter drainage is often ineffective.

Surgical drainage either via laparoscopic or open approach may become necessary if initial therapies fail. Liver resection is rarely required, in cases such as recalcitrant abscess or ruptured liver abscess presenting with peritonitis.

AMOEBIC LIVER ABSCESS:

Amoebic liver abscess is more commonly found in tropical and developing countries. Its causative organism, entamoeba histolytica, is a parasite that is endemic worldwide, infecting an approximate 10% of world's population. In contrast to pyogenic liver abscess, amoebic liver abscess is more commonly seen in 20 – 40 years age group with male being the most commonly affected gender in the ratio of 10:1. Heavy alcohol consumption is commonly reported as a risk factor and may render the liver more susceptible to amebic infection. Patients with impaired host immunity,

AIDS, on chemotherapy, chronic steroid use etc, also appear to be at higher risk of infection and have higher mortality rates.

PATHOGENESIS

The causative organism of amoebic liver abscess, E. histolytica is a protozoan and exists as a trophozoite or a cyst. They invade the human body via the fecal oral route. Human is the main host and the main source of infection is a contact with a human cyst carrying carrier.

Contaminated water and vegetable also acts as routes of infection. The cyst form passes through the stomach and small bowel unharmed and then transforms into a trophozoite in the colon. It then invades the colonic mucosa forming a flask shaped ulcers, then enters the portal

system and invades the liver. There is no evidence which suggest that trophozoite travel via the lymphatics. The principle mechanism of trophozoites is enzymatic cellular hydrolysis. Amebic liver abscesses are formed by localized hepatic necrosis producing a cavity containing acellular proteinaceous debris surrounded by a rim of invasive amebic trophozoites. This abscess is more commonly found in the superior anterior aspect of right liver near the diaphragm. The appearance of this thick, reddish brown, pus like material is likened to anchovy paste or chocolate sauce.[3] This pus is odorless unless there is secondary bacterial infection. The progressive hepatic necrosis continues until Glisson apsule is reached because this capsule is resistant to hydrolysis by the amoebae. Thus, amoebic abscess is crisscrossed by the portal triad protected by this peritoneal sheath.

CLINICAL FEATURES

Patients presents with symptoms lasting few days to weeks of duration. The presenting symptoms the commonly fever, chills, anorexia, right upper quadrant pain (typically dull and constant) and tenderness, and hepatomegaly. About only 25% of patients (approx) also presents with diarrhea despite having a colonic infection. In about 22% of patients, jaundice is present due to a large abscess compressing the biliary tree. When symptoms have been present for weeks, patients may

present with myalgia and weight loss. In the presence of irritation of right hemi diaphragm, pleuritic or right shoulder pain may occur. In amoebic abscess of left liver, epigastric or left sided pain and tenderness may be present. Rare cases of rupture into the pleural space, pericardium, and other intraabdominal organs have also been reported.

Certain differences exists in patients presenting in an acute (<10days) and chronic (>2weeks) setting. In acute cases, patients generally have high fevers, chills, and significant abdominal tenderness. In 50% of these patients, patients presents with multiple lesions. Whereas in chronic patients, more than 80% of patients have a single right sided liver abscess.

INVESTIGATIONS

In amoebic liver abscess, most patients will have elevated white blood cell counts with no eosinophilia. Other abnormalities include, increased serum alkaline phosphatase in about 75% of patients with increased transaminases, total bilirubin and hypoalbuminemia ccasionally seen. Although in most patients with amoebic liver abscess, E. histolytica is not seen in fecal specimens, antibodies in serum are encountered in 92% to 99% of patients, about 7 – 10 days after appearance of symptoms. Other immunological tests includes Indirect hemagglutination and enzyme-linked immunosorbent assay (ELISA) sensitivities of 99%

and 97.9% and specificities of 99.8% and 94.8%, respectively. Therefore, those patients with negative antibody test is unlikely to have amoebiasis.

In majority of patients with amebic hepatic abscesses, chest radiographs are abnormal with findings which includes elevation of the right pleural effusion, right hemidiaphragm and atelectasis in the region of the base of the right lung. The imaging investigation of choice is CT scan as it gives detailed information like enhancing wall and surrounding edema as well as extra hepatic involvement. It's a very sensitive investigation though not very specific. Ultrasonography is very useful as well, but its accuracy is influenced by physiologic changes such as hepatic steatosis, has a resolution inferior to that of CT scans and is associated with the skills of the operator. Though rarely required, MRI shows homogeneous low signal intensity on T1- and high signal intensity on T2-weighted images. Technetium Tc99m nuclear scanning shows a photopenic area with gallium scan showing amoebic abscess as cold spots as they do not contain leukocytes, which may aid in differentiating them from pyogenic abscesses.

TREATMENT

Treatment of hepatic amebic abscesses is mainly based on amebicidal drugs with metronidazole being the drug of choice as it has

shown to be effective against both intestinal and extraintestinal sites It an be given in doses ranging from 750 mg orally three times daily or 500 mg intravenously every 6 hours for 7 to 10 days, with oral administration being the preferred route. It is usually successful in 95% of cases. Defervescence usually occurs in 3 to 5 days, but duration may differ to upto 30 to 300 for the abscess to resolve and it depends on the initial size at presentation. In those patients who are slow to respond or have recurrence of the disease a prolonged course of metronidazole maybe tried or nitroimidazole with a longer half-life (e.g.,tinidazole) can be given at a dose of 2g for 3 days. Paromomycin or iodoquinol, which are luminal agents can be tried for 10 days and 20 days respectively, for invasive amoebiasis following therapy. In amoebic liver abscess aspirations or surgical drainage is rarely required as it can almost always be treated by medical management alone. Indications for percutaneous drainage include cases of poor response to antiamebic agents, when superinfection is suspected, or when there is a risk of rupture. Open surgical drainage is indicated only in severe, complicated cases.

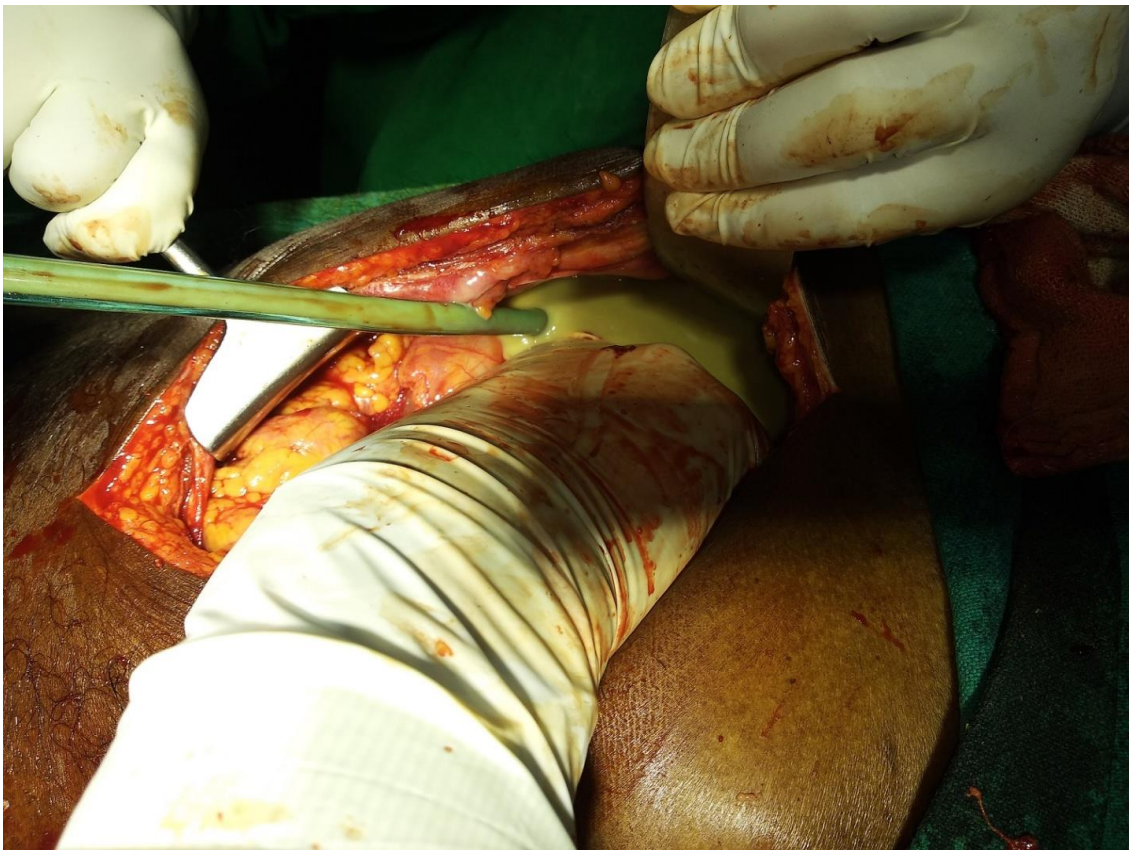


FIG: Open surgical drainage of Pyogenic Liver Abscess.

STUDIES DONE ON LIVER ABSCESS:

- Kemparaj T, Khan MR, Narayan S et al did a retrospective analysis on the clinical features, examination findings, laboratory investigations, radiological tests, microbiological analysis and treatment modalities of patients with liver abscess and found the mean age of patients to be 42.25years, where majority where alcoholics. The abscesses were commonly in the right lobe (80%) and solitary (72%) and were predominantly amoebic in 72% of cases. Percutaneous needle aspiration was done in 34%, pigtail drainage in 48% and surgical intervention for rupture in 4% patients. Mortality was 2.5% with all death reported in surgical group.[4]

- Jayakar SR, Nichkaode PB et al did a hospital based longitudinal study where the presentation, role of conservative treatment, aspiration, pigtail catheter, outcome and post procedural complaints were studied. Here, males were affected more than females with imaging being the best modality for diagnosis, therapy and follow up. Aspiration or pigtail catheter drainage was the standard method of choice and pigtail being the better method of treatment than aspiration.[5]

- Dulku G, Mohan G, Samuelson S, Ferguson J, Tibballs J et al reviewed retrospectively the effectiveness and outcomes in the liver abscess drainage performed by different operators using percutaneous aspiration and catheter drainage and came to a conclusion that both percutaneous aspiration and percutaneous catheter drainage are equally effective in the drainage of liver abscess. Since percutaneous aspiration was simpler and safer to perform and also due to the higher incidence of indwelling catheter associated complications, they suggested a trial of percutaneous aspiration to be attempted first.[6]

- Steffen J. haider, Massimo Tarulli, nancy J. McNulty, Eric K. Hoffer et al studied the details of percutaneous catheter drainage(PCD) of pyogenic liver abscesses, the etiological factors and the management technique that contribute to successful treatment. They found that drains were successful in 72% of the patients and about 23% needed salvage PCD and overall success was achieved in 95% of the patients with 5% mortality rate due to sepsis.[7]

- M.A. Abusedera, M.E. Ashraf et al compared the outcome of catheter drainage (CD) versus intermittent needle aspiration of pyogenic liver abscess. They conducted their study on 88 patients among which 65

were men and 23 women with a mean age of 44.6 years (18 – 73). They were divided into two groups randomly, aspiration group with maximum of three attempts and the Catheter drainage group. Aspiration was successful in 60% (26/43) of the cases and CD was successful in 98% (44/45) of the cases. Hence they came to a conclusion that, CD was more efficient than needle aspiration.[8]

- Chung Y F A, Tan Y M, Lui H F, Tay K H, Lo R H G, Kurup A, Tan B H et al reviewed the literature on the management of pyogenic liver abscess, focusing on the choice of drainage. They suggested the therapy to be individualized according to patients clinical status and abscess factors. Percutaneous image guided drainage is appropriate as first line treatment when there are no urgent surgical indication for peritonitis. Surgical drainage may be considered in large multiloculated abscesses and those associated with concomitant biliary pathology.[9]

- Dutta A, Kishangunj, Bandyopadhyay S et al studied the management of liver abscess and concluded that medical therapy alone is effective in most cases of amoebic liver abscess (ALA) while some form of intervention is usually needed for pyogenic liver abscess (PLA). Mortality is low with ALA compared with PLA. Abscesses are slow

to resolve and a multidisciplinary approach, including a gastroenterologist, radiologist, surgeon and laboratory is crucial fro successful treatment of these curable diseases.[10]

- Kapadia S, Duttaroy D, Ghodgaonkar P, Maru S et al studied the effectiveness of percutaneous catheter drainage of liver abscess and showed a success rate of 88% (Successful treatment in 22 out of 25 patients). They concluded that percutaneous catheter drainage of liver abscesses was successful with a low morbidity and mortality and should be the first line of management in liquefied moderate to large sized liver abscess.[11]

- Simon C.H. Yu, Simon S.M. Ho, Wan Y. Lau, Deacons T. K. Yeung, Edmund H.Y. Yuen, Paul S.F. lee, Constantine Metreweli et al compared the therapeutic effectiveness of continuous catheter drainage versus intermittent needle aspiration in the percutaneous treatment of pyogenic liver abscesses over a 5 year period in 64 patients. Their study showed no significant difference between the two groups in terms of treatment success rate, duration of hospital stay, morbidity or mortality which suggested that both procedures are probably equally effective and safe. And also since the intermittent needle aspiration technique was easier, simpler, less time consuming

and less expensive, it deserved to be considered as a first line drainage approach for pyogenic liver abscesses.[12]

- Tan Y.M, Chung A Y, Chow P KK, Cheow P C, Wong W K, Lucien L, Soo K C et al did an appraisal to determine whether first line treatment with percutaneous or surgical drainage of liver abscesses larger than 5 cm results in better clinical outcome. Here a total of 96 patients were treated with SD and PD over the 3 year period. They found the mortality rate for SD and PD to be 4.5% and 2.8% respectively, which was much lower than previously reported for the SD group. They, therefore, concluded that surgical drainage can result in better clinical outcome than PD with comparable morbidity and mortality.[13]

- Khan A, Tekam V K et al. conducted a study on 65 patients of liver abscess to compare modalities of percutaneous treatment of liver abscess which were needle aspiration and pigtail catheter. Their results suggested amoebic liver abscess to be more common as compared to pyogenic liver abscess. Clinical recovery was significantly earlier in catheter group (average 5 days) than in needle aspiration group (average 6.29 days). Average duration of I.V. antibiotics was significantly shorter in catheter group (6.4days) than in

needle aspiration group (9.5days). Hence, they concluded that in view of greater volume of pus drained in first setting, early clinical recovery, shorted duration of hospital stay and slightly more success rate in continuous catheter drainage was more effective modality of percutaneous treatment than intermittent liver aspiration.[14]

- Heneghan HM, Healy NA, Martin ST, Ryan RS, Nolan N, Traynor O, Waldron R et al did a case series review of patients admitted with liver abscess over a period of 5 years regarding clinical presentation, aetiology, diagnostic workup treatment, morbidity and mortality. A total of 11 patients were reviewed and the common clinical featured at presentation were non-specific constitutional symptoms and signs. Aetiologicy was predominantly gallstones (45%) or diverticular disease (27%). In addition to empiric antimicrobial therapy, all patients underwent radiologically guided percutaneous drainage of the liver abscess at diagnosis and only 2 patients required surgical intervention. They concluded that pyogenic liver abscesses were uncommon and mortality had decreased over the last two decades. Antimicrobial therapy and radiological intervention formed the mainstay of modern treatment. Surgical intervention should be considered for patients with large, complex, septated or multiple

abscesses, underlying disease or in whom percutaneous drainage has failed.[15]

- Marianna G Mavilia, marco Molina and George Y Wu reviewed the evolving nature of hepatic abscess. They found that hepatic abscess is associated with a relatively high mortality rate and also several serious complications. For these reasons, prompt recognition is important in instituting effective management and achieving a good outcome. Because of the nonspecific symptoms and laboratory findings, the presence of predisposing factors might be helpful in increasing the level of diagnostic suspicion. Radiological features can also help with both classification of hepatic abscess and selection of the most appropriate treatment approach, and depending on its characteristics, hepatic abscess can effectively be treated by either percutaneous drainage or surgical drainage in combination with antibiotics. The key to successful outcomes with both approaches was early diagnosis and institution of appropriate therapy.[16]

- Sudhir R, Jayakar, Prabhat B, Nichkaode et al carried out a longitudinal study of 55 patients with liver abscess and studied the presentation, role of conservative treatment, aspiration, pigtail catheter, outcome and post procedural complications. They concluded

that male sex was affected more commonly than females and that imaging is the best modality for diagnosis, therapy and follow up. The standard method of drainage is aspiration or pigtail drainage and among them pigtail drainage is the better method of treatment than aspiration.[17]

- Soumik Ghosh, Sourabh Sharma, A. K. gadpayle et al, conducted a cross sectional study to describe t he clinical profile, microbiological aetiologies and management outcomes in patients with liver abscess. They conducted this study on 200 patients and found that young alcoholic male from the lower socio economic strata of people with amoebic liver abscess presenting as a solitary nodule was the most common pattern in their series. Liver abscess was rare in female patients and along with amoebic and pyogenic liver abscess, tubercular liver abscess were also encountered. The average age of the patient was around 40 years but increased incidence of mortality was encountered in the seventh decade. The presence of cough was usually associated with significant pleural effusion and presence of ascites should raise the suspicion of TLA or associated CLD. In those patients undergoing surgical drainage, mortality rate was high but overall mortality was low probably due to use of minimally invasive

drainage techniques and aetiology specific antimicrobials in all patients.[18]

- N. Sharma, A. Sharma, S. Varma, A. Lal, and V. Singh did a retrospective analysis of 86 indoor cases of amoebic liver abscess presenting to the emergency department over a 5 year period. They concluded that amoebic liver abscess presents commonly to the emergency department and such should be suspected in patients presenting with prolonged fever and pain abdomen. In terms of management modalities, conservative management for uncomplicated amoebic liver abscess and insertion of single percutaneous pigtail catheter drainage for complicated amoebic liver abscess are efficacious.[19]

- G.D. Branum, G. S. Tyson, M. A. Branum and W. C. Mayers, did a detailed review of multiple clinical parameters in 73 patients who were treated for pyogenic hepatic abscess during a 17 year period. Here, the mean age of patients was 55 yearss and among them 38 (52%) of them were male. The mortality rate was comparable for solitary (17%) and multiple (23%) abscesses. The final determinant of outcome was the underlying disease, ie, malignancy or an immunocompromised patient rather than solitary versus multiple

abscesses. They suggested the choice of management to be individualized and the principle of timely diagnosis and prompt institution of treatment appropriate to the specific patients to remain as the standard of care in this potentially grave disease.[20]

- M. Yoo, W. H. kim, S. K. Shin, W. H. Chun, J. K. Kang and I. S. Park, did a comprehensive review for liver abscess cases for the past 20 years where a total of 482 cases were reviewed. Here they compared the etiology, clonical featured, therapeutic modalities and prognosis patients with liver abscess. They found that among a total of 482 cases, 38% were of the amoebic variety, 26% had pyogenic abscess, 3 % were of the mixed variety. 33% of the patient ahd unknown etiology in the 1970s and 22% were amebic, 50% pyogenic, 2% mixed and 27% of unknown etiology. It showed the increasing trend of pyogenic liver abscess as compared to amoebic liver abscess. The male to female ration in their study was 22:1 with male predominance and the average age of the patients was 44.3 years. The main clinical symptoms were abdominal pain, fver with chills, nausea and vomiting and in laboratory investigations, anemia, Leucocytosis and thrombocytopenia were common. Percutaneous aspiration was recommended in failed antibiotic therapy for amoebic liver abscess. Mortality was 3% for amebic and 17% for pyogenic.[21]

- Mohit Bhatia and Mutuza Ali in 2017 in VMMC and Safdarjung hospital, They did an analysis of 50 patients with ruptured liver abscess and found that male patients were affected in 86% of the cases and the age group most commonly affected belonged to the 41-50 years. Right hypochondrium pain was the most common presenting symptom and only 18% presented with features of toxemia. The right lobe was more commonly involved (88%) of the cases and compared to left lobe (10%) and both lobes together (2%). The organism most commonly isolated was Escherichia coli (38%). The most probable cause was attributed to alcohol consumption. They emphasized the starting of treatment on time to avoid mortality.[22]
- JA Alvarez, JJ Gonzalez, RF Baldonedo, L Sanz, A Junco, JI Rodrfiguez and MD Matinez conducted a retrospective study to evaluate whether older patients with pyogenic liver abscess have distinctive presenting features or whether their management and outcome differ from that of younger patients. They conducted their study in a total of 133 patients. From among them, 78 patients were in the older age group (age $\geq$60) and 55 were in the younger age group (age < 60years). The median age for the older age group was 72 years and for the younger age group it was 42 years. In the older age group, the male to female ratio was 41:37 and 41:14 for the younger age

group. The predominant source of pyogenic liver abscess was found to be the biliary tract in 57 patients. They concluded that, elderly patients with pyogenic liver abscess have certain subtle differences in clinical and laboratory presentation but they do not appear to delay the diagnosis. Active management is well tolerated and there is no difference in mortality rate or actually have lower morbidity rate than in younger patients.[23]

- M. Mukhopadhyay, A. K. Saha, A. Sarkar and S. Mukherjee, they did a prospective study to researched the various types of clinical presentation and complications of amoebic liver abscess to establish early diagnosis and to prevent complications. They had a study population of 72 patients. The age of the patients ranged from 21 to 72 years with the mean age being 43.64 years. The highest incidence was in the 31 – 40 year age group. Male were the predominant sex with 66 out of the total 72 and only 6 females. Pain was the most commonly found clinical feature with a total of 60 patients complaining of the same followed by fever which was seen in 58 patients. Right lobe was involved in 54 patients with 44 patients giving the history of alcohol consumption. The most common complication encountered was pleuropulmonary in 24 patients followed by intraperitoneal rupture in 19 patients. They concluded that in an endemic area, a patient presenting with lower chest or upper abdominal pain along with

tender hepatomegaly should raise the suspicion of amoebic liver abscess.[24]

STUDY DESIGN

Prospective cohort study

METHODOLOGY

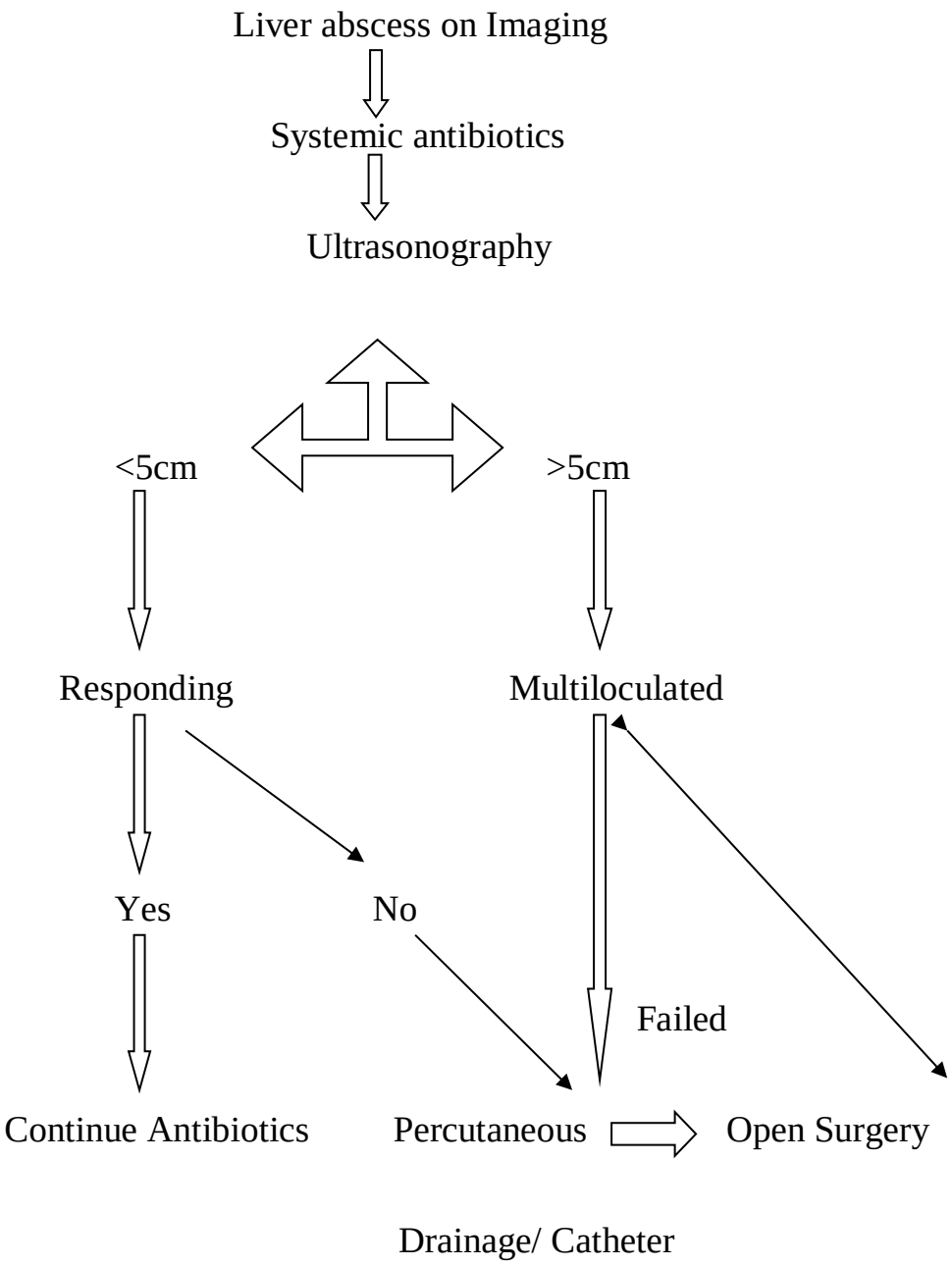
Patients presenting to the surgery ward with clinical features of liver abscess both diagnosed and undiagnosed with detailed laboratory and radiological evidence, its etiology, history, treatment modalities (conservative, percutaneous aspiration, catheter drainage or open surgical drainage) as per standard guidelines and outcome of the disease will be analyzed in this study.

Sample size (n) = 50 (mean of patients with Liver abscess in the last 3 years in the surgical ward) Patients admitted with Liver abscess during a period extending from January 2018 to December 2018 was included in this study.

For each patient, a detailed history, clinical examination and laboratory profiles of the patient were recorded. All patients underwent complete blood cound, rena function test, liver function test and coagulation profile. Reference ranges were defined as per the hospital

protocol. Every abscess was send for culture and every patient underwent Chect X-ray and Ultrasonography – abdomen and pelvis.

The protocol followed for management of liver abscess is described below:



INCLUSION CRITERIA

- Patients above 18 years of age
- Patients admitted with liver abscess in the surgical ward.

EXCLUSION CRITERIA

- Patients who are below 18 years of age
- Patients were excluded if the abscess was ruptured at initial presentation or if there was a concomitant pathology that required urgent surgical intervention like Perforation, Appendicitis or carcinoma of Liver.

OBSERVATION AND RESULTS

A total of 50 patients with diagnosis of liver abscess were included in this study. The history, clinical features, laboratory and imaging data were collected and recorded. The treatment modality followed and the outcome was studied.

The observations are as follows:

Out of 50 patients, most of them (28%) belonged to 31-40 years age group. The mean age of the patients was 46.7 years. The youngest patient was 23years old and the oldest being 75 years old.

Table 1: Distribution of patients according to the age group

Age (in years)	Number (n=50)	%
20 – 30	6	12
31 – 40	14	28
41 – 50	11	22
51 – 60	12	24
>60	7	14
Total	50	100

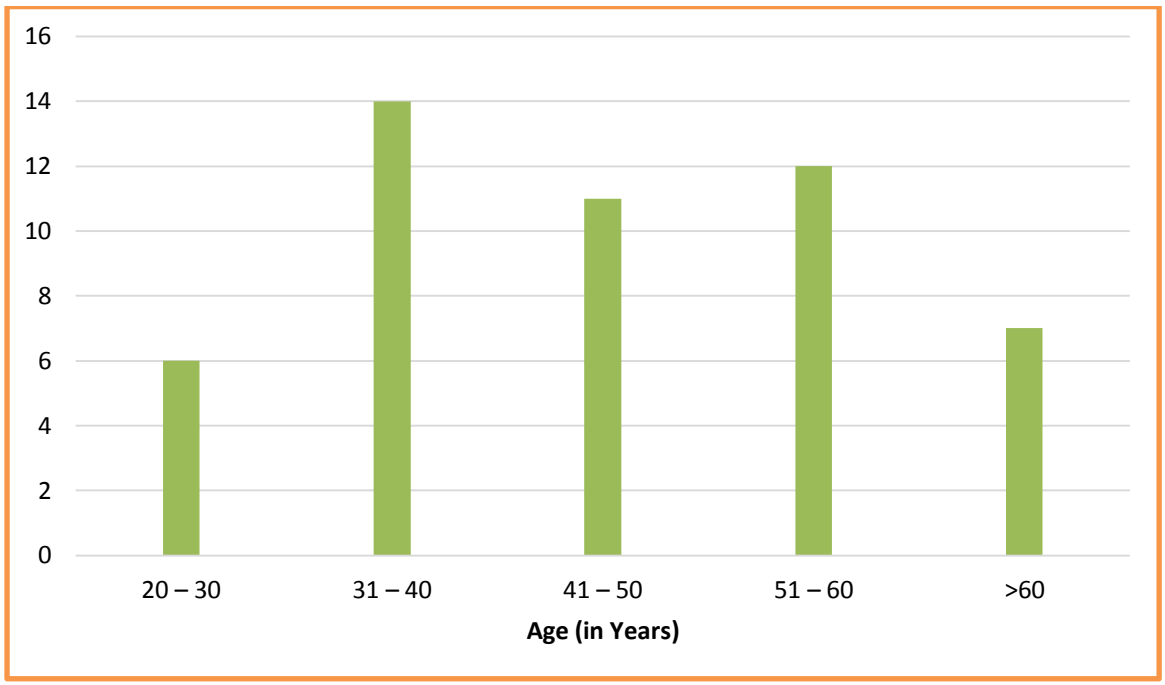


Figure 1: Distribution of patients according to the age group

According to their gender, Out of 50 patients, majority (90%) of the patients were male. Only 10% were female. Male to female ratio is found to be 9:1.

Table 2: Distribution of patients according to their gender

Gender	Number (n=50)	%
Male	45	90
Female	5	10
Total	50	100

The most common Clinical manifestation reported was Abdominal pain (96%) followed by Fever (84%) and Right Hypochondriac Tenderness (82%). Only four patients had complaints of Weight loss.

Table 3: Distribution of patients according to the Clinical manifestations

Clinical manifestations	Number (n=50)	%
Abdominal pain	48	96
Fever	42	84
Chills and Rigors	40	80
Right Hypochondriac Tenderness	41	82
Nausea and Vomiting	26	52
Jaundice	12	24
Weight loss	4	8

Multiple response

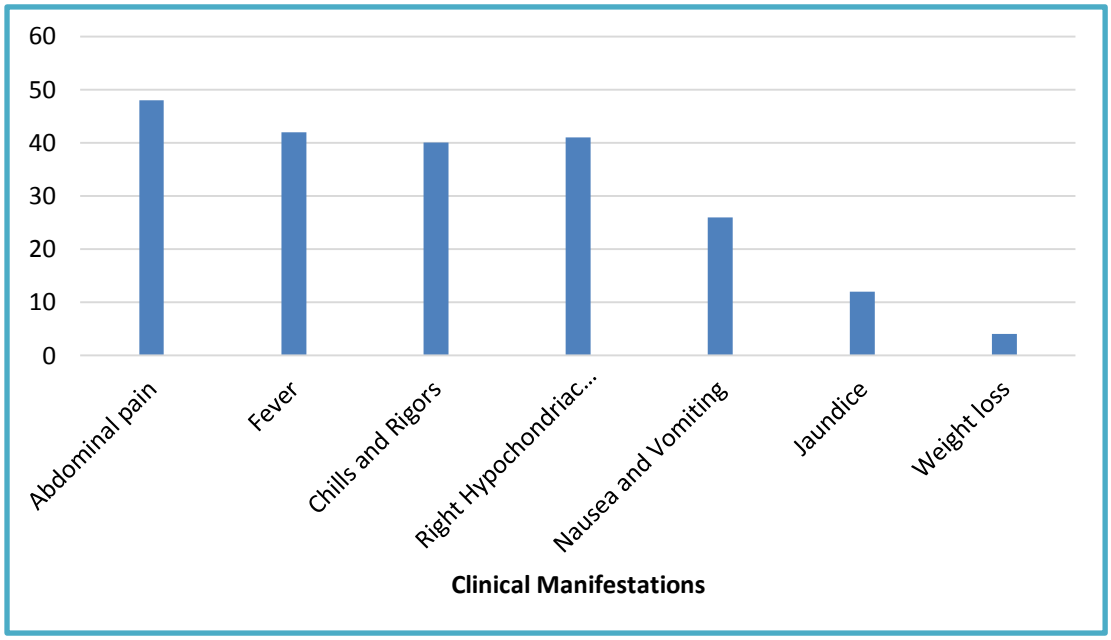


Figure 2: Distribution of patients according to the Clinical manifestation

Regarding risk factors, Out of 50 patients, 84% had history of alcohol intake and 38% had history of Diabetes. History of tuberculosis was present in 16% of patients.

Table 4. Showing distribution of respondents based on the risk factors.

Risk factors	Number (n=50)	%
Alcohol	42	84
Diabetes	19	38
Tuberculosis	8	16

The liver abscess was classified according to their causative organisms as Amoebic or pyogenic liver abscess. Out of 50 patients, 31 (60%) presented with Amoebic Liver Abscess and 19 (40%) presented with Pyogenic Liver Abscess.

Table 5: Distribution of patients according to the type of Abscess

Type of Abscess	Number (n=50)	%
Amoebic Liver Abscess	31	62
Pyogenic Liver Abscess	19	38
Total	**50**	**100**

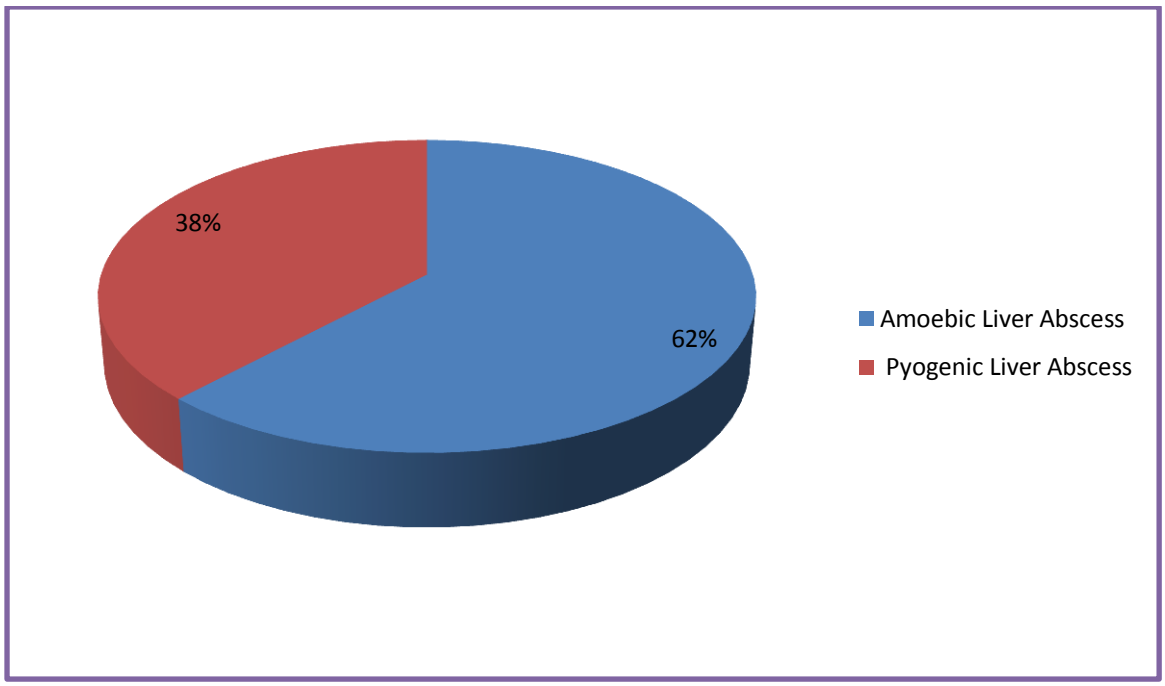


Figure 3: Distribution of patients according to the type of Abscess

Ultrasonography is a highly sensitive test for liver abscess and the affected lobe of the liver was identified using USG with sizes varying from 3cm to 17cm. Out of 50 patients, 39 (78%) presented with abscess in the right lobe of liver and 8 (16%) presented with abscess in the left lobe of liver. Both lobes were involved in 6% of cases.

Table 6: Distribution of patients according to the site of abscess via USG

Site of abscess	Number (n=50)	%
Right Lobe	39	78
Left Lobe	8	16
Both Lobe	3	6
Total	**50**	**100**

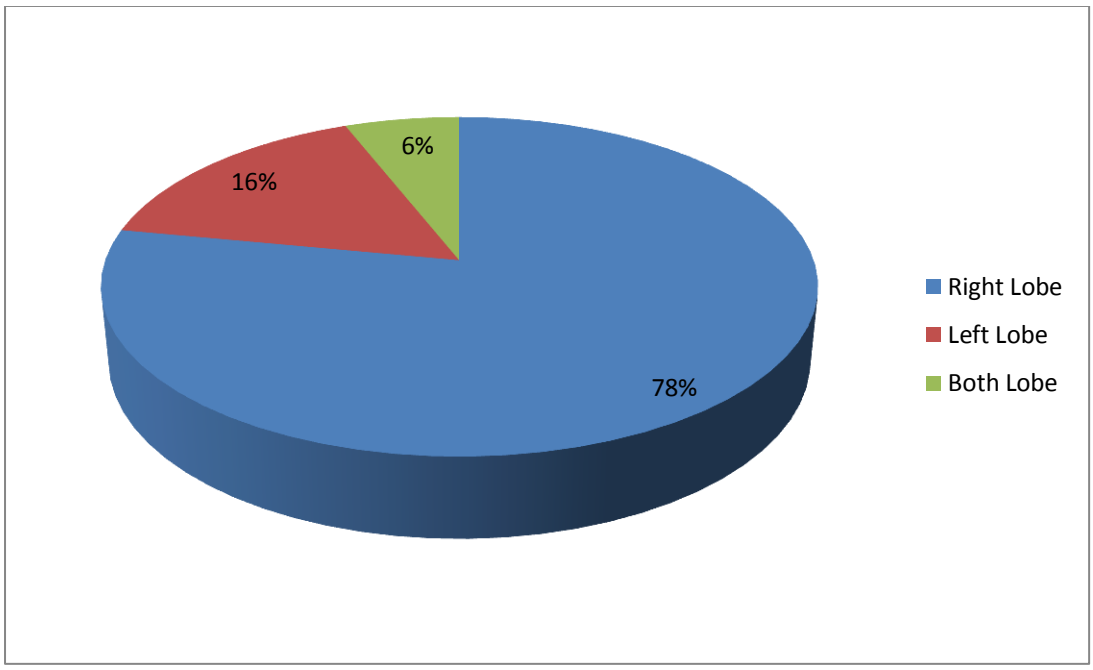


Figure 4: Distribution of patients according to the type of Abscess

Table 7: Distribution of patients according to number of abscess via USG

Number of abscess	Number (n=50)	%
Single	42	84
Multiple	8	16
Total	50	100

The patients were also segregated according to the total number of abscess. Out of 50 patients, 84% (42) presented with single abscess and 16% (8) presented with multiple abscess.

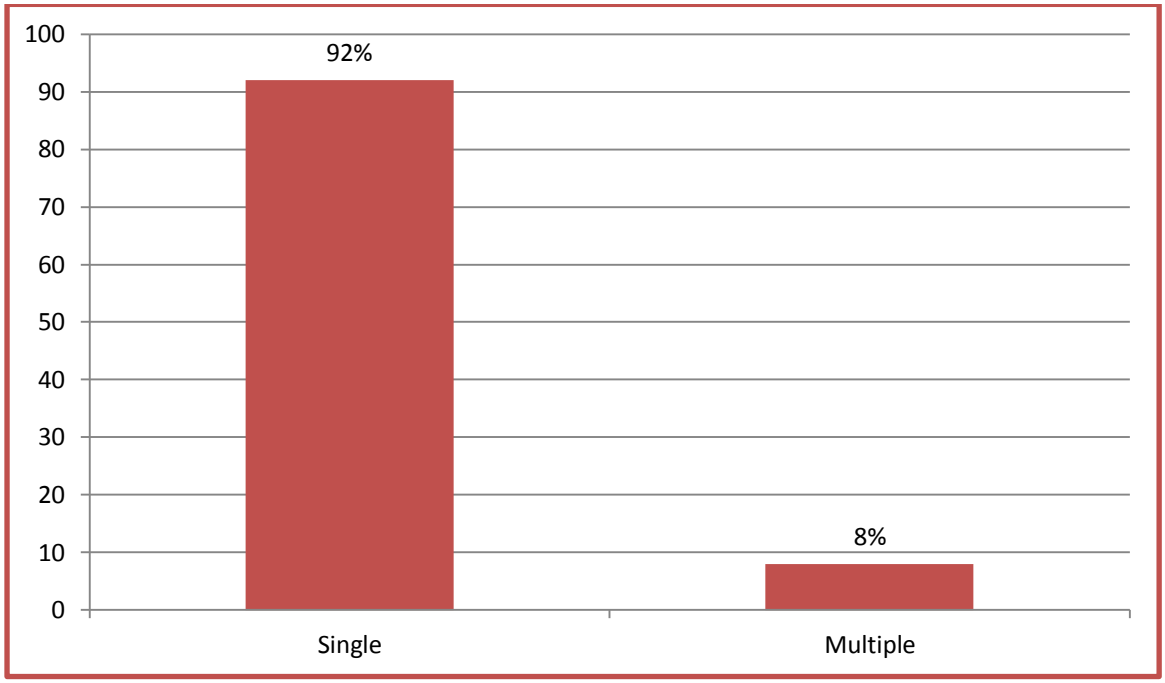


Figure 5: Distribution of patients according to number of abscess

Table 8: Distribution of patients according to the various modalities of treatment

Modalities of treatment	Number (n=50)	%
Conservative	8	16
USG Guided Percutaneous Aspiration or pigtail catheter	39	78
Surgical drainage	3	6
Total	**50**	**100**

Out of 50 patients,USG Guided Percutaneous Aspiration or pigtail catheter was done in 72% (36) followed by 16% (8) in Conservative, while 6% (3) underwent open surgical drainage.

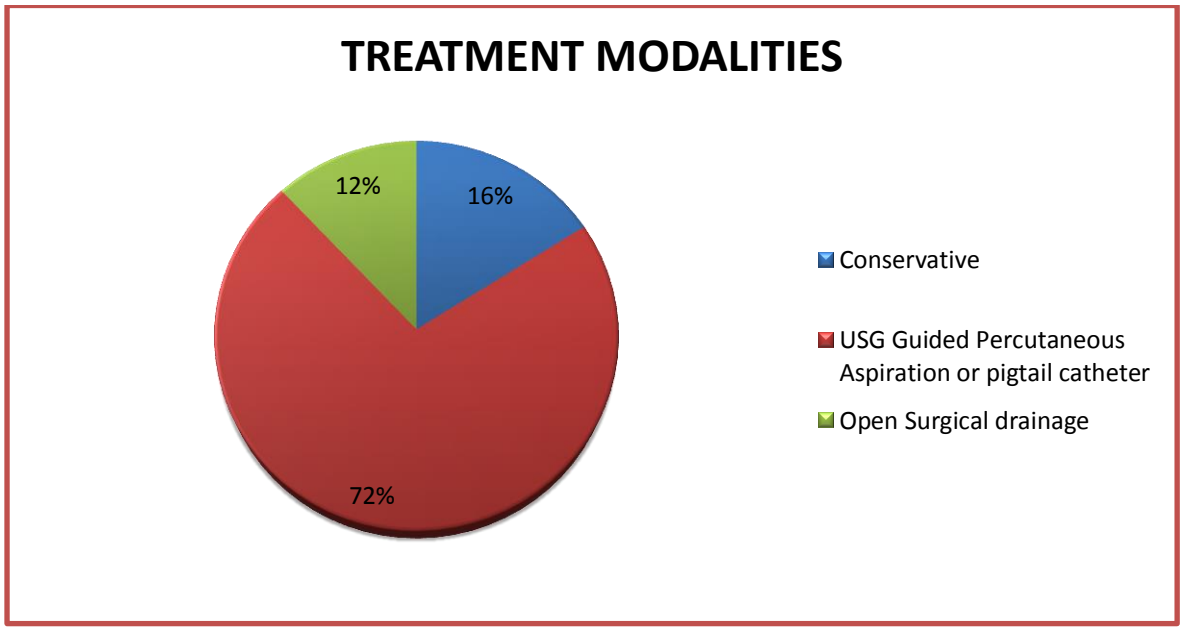


Figure 6: Distribution according to various treatment modalities.

Table 9: Distribution of patients according to the type of organisms isolated in pyogenic liver abscess

Organisms isolated	Number (n=11)	%
E.coli	5	45.45
Klebsiella	3	27.27
Proteus	2	18.18
Staphylococcus	1	9.09
Total	**11**	**100**

The most common organism isolated was E.coli (45.45%) followed by Klebsiella (27.27%) in pyogenic liver abscess. The other organism isolated includes Proteus (18.18%) and Staphylococcus (9.09%).

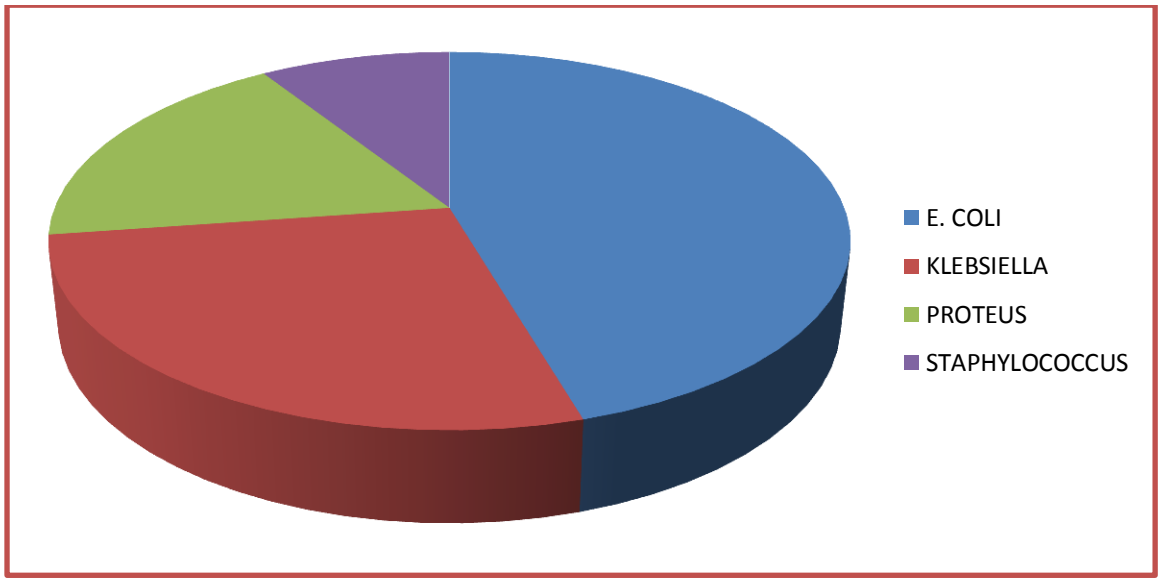


Figure 7: distribution of patients according to the type of organisms isolated in pyogenic liver abscess

Table 10: Distribution of patients according to the laboratory profiles.

Investigation	Value	Number	%
Hb. (g/dl)	<11gm/dl	12	24
TLC	>11000	34	68
Bilirubin	>1.2	10	20
Urea	>40	8	16
Creatinine	>1.2	6	12
Alkaline phosphatase	>150IU/L	10	20
SGOT	>50IU/L	4	8
SGPT	>50IU/L	8	16
PTI/INR	<1.2	7	14
ESR	>20	18	36

From a total of 50 patients, 34 (68%) of them had elevated TLC and 12 (24%) had anemia. A total of 10 (20%) of the patients had elevated alkaline phosphatase with elevated SGOT in 4 (8%) and SGPT in 8 (16%) of the patients respectively.

Table 11: Association of number of abscess with type of abscess

Number of abscess	Amoebic Liver Abscess (%)	Pyogenic Liver Abscess (%)	Total	p-value
Single	26 (61.90)	16 (38.10)	42 (100)	1.0000
Multiple	5 (62.50)	3 (37.50)	8 (100)	
Total	**31**	**19**	**50**	

Out of 42 patients with single abscess, 61.90% had amoebic liver abscess and 38.10% had pyogenic liver abscess. Out of those with multiple abscess, 62.50% had amoebic liver abscess and 37.50% had pyogenic liver abscess. The association was not found to be statistically significant. (P-value = 1.0000)

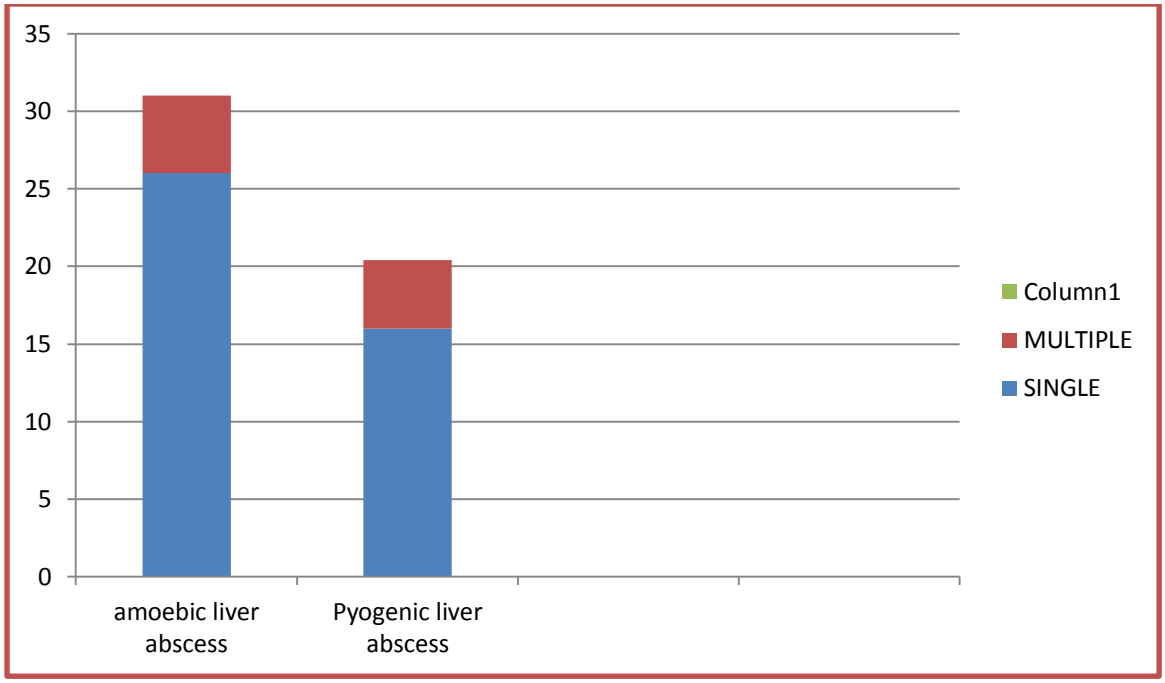


Figure 8: Association of number of abscess with type of abscess

Table 12: Association of site of abscess with type of abscess

Site of abscess	Amoebic Liver Abscess (%)	Pyogenic Liver Abscess (%)	Total	p-value
Right Lobe	25 (64.10)	14 (35.90)	39 (100)	0.8219
Left Lobe	5 (62.50)	3 (37.50)	8(100)	
Both Lobe	1 (33.33)	2 (66.67)	3(100)	
Total	31	19	50	

Out of 39 patients with right lobe involvement, 64.10% had amoebic liver abscess and 35.90% had pyogenic liver abscess. Out of those with left lobe involvement, 62.50% had amoebic liver abscess and 37.50% had pyogenic liver abscess. Out of those with both lobe involvement, 33.33% had amoebic liver abscess and 66.67% had pyogenic liver abscess. The association was not found to be statistically significant.

Table 13: Association of alcohol intake with type of abscess

Alcohol intake	Amoebic Liver Abscess(%)	Pyogenic Liver Abscess(%)	Total	p-value
Yes	25 (78.13)	7 (21.87)	32 (100)	0.0047
No	6 (33.33)	12 (66.67)	18 (100)	
Total	31	19	50	

Out of 32 patients with history of alcohol intake, 78.13% had amoebic liver abscess and 21.87% had pyogenic liver abscess. Out of those with history of diabetes, 33.33% had amoebic liver abscess and 66.67% had pyogenic liver abscess. The association was found to be statistically significant.

Table 14: Association of diabetes with type of abscess

Diabetes	Amoebic Liver Abscess(%)	Pyogenic Liver Abscess(%)	Total	p-value
Yes	11 (57.89)	8 (42.11)	19 (100)	0.8665
No	20 (64.52)	11 (35.48)	31 (100)	
Total	31	19	50	

In pyogenic liver abscess, 11 patients had diabetes and in amoebic liver abscess 8 patients had history of diabetes. The association was found to be statistically insignificant.

Table 15: Association of age with type of abscess

Age (in years)	Amoebic Liver Abscess(%)	Pyogenic Liver Abscess(%)	Total	p-value
20 – 30	2 (33.33)	4 (66.67)	6 (100)	0.4051
31 – 40	9 (69.23)	4 (30.77)	13(100)	
41 – 50	9 (81.82)	2 (18.18)	11(100)	
51 – 60	8 (61.54)	5 (38.46)	13(100)	
>60	3 (42.86)	4 (57.14)	7(100)	
Total	**31**	**19**	**50**	

In amoebic liver abscess, the age group with maximum no patients were 31 – 40 and 41 – 50 age groups with each having a total of 9 patients. And in pyogenic liver abscess, the age group with maximum no of patients were 51 – 60 with a total of 5 patients.

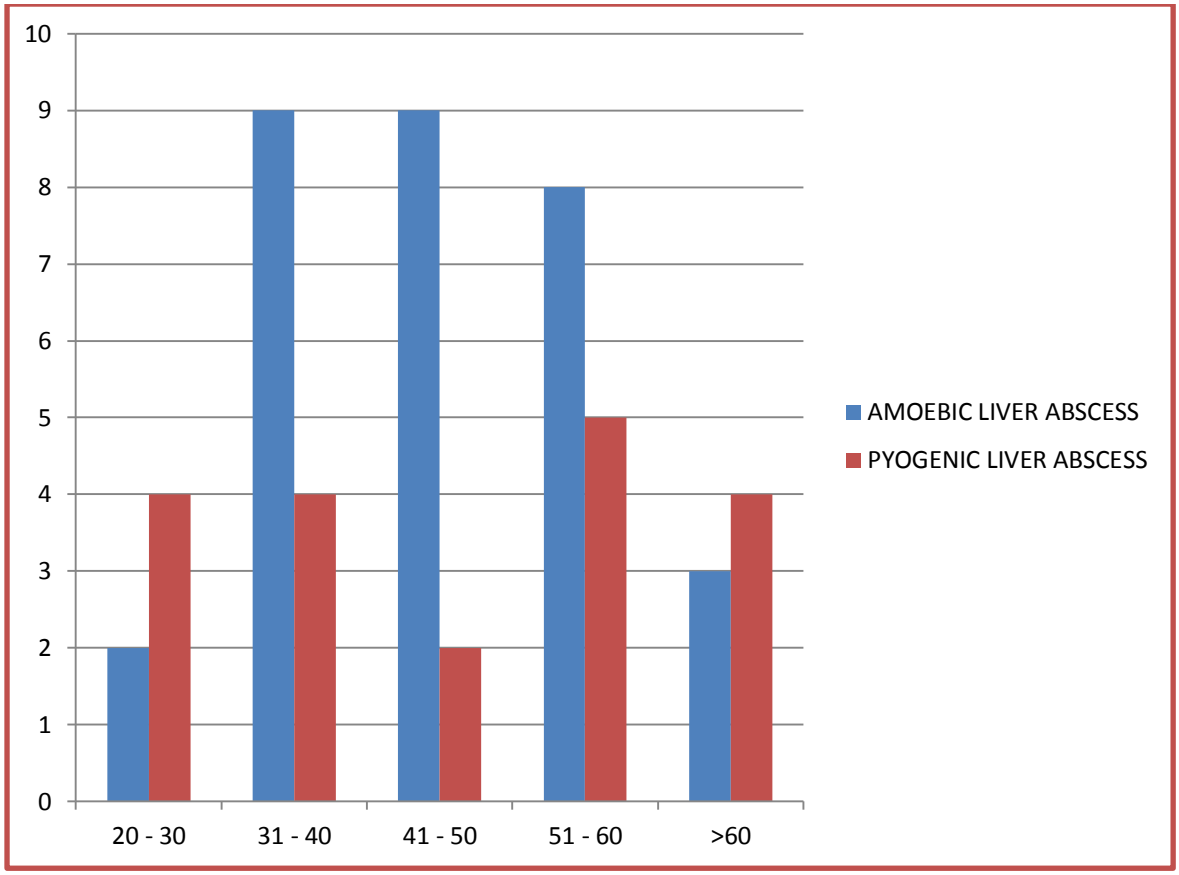


Fig 9: Association of age with type of abscess

Table 16: Association of reduction in volume in USG following percutaneous aspiration/catheter drainage

TYPE OF ABSCESS	DAY 3	DAY 7	TOAL
AMOEBIC LIVER ABSCESS (N – 31)	20 (66.67%)	9 (18%)	29 (93.55%)
PYOGENIC LIVER ABSCESS (N – 19)	14 (73.68%)	4 (21.05%)	18 (94.74%)

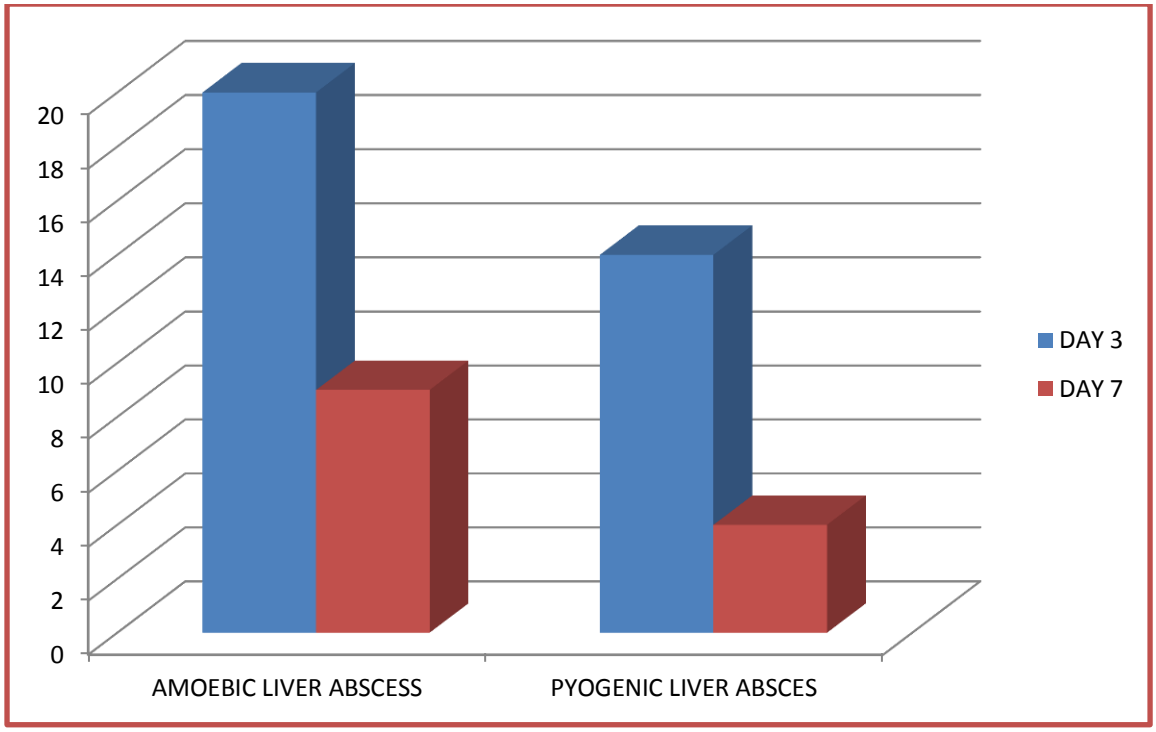


Fig 10: Association of reduction in volume in USG following percutaneous aspiration/catheter drainage

Table 17: Association of resolution of symptoms post treatment (conservative and USG guided percutaneous/ catheter drainage)

SYMPTOMS	DAY 3	DAY 7	PERCENTAGE
ABDOMINAL PAIN (n – 48)	33 (68.75%)	11 (22.91%)	91.67%
FEVER (n – 42)	18 (42.85%)	22 (52.38%)	95.23%
CHILLS AND RIGORS (n – 40)	22 (55%)	18 (45%)	100%
RIGHT HYPOCHONDRIUM TENDERNESSS (n – 41)	6 (14.63%)	30 (73.17%)	87.8%
NAUSEA AND VOMITING (n-26)	22 (84.61%)	4 (15.38%)	100%
JAUNDICE (n – 12)	NIL	3 (25%)	25%

The outcome of patients post treatment, 68.75% of patients had resolution of abdominal pain by 3rd day post procedure and about 91.67% of the patients were free of the symptom by the 7th day. By the 3rd day, 42.85% of the patients with fever and by the 7th day, 95.23% of the patients didn't have fever. The patients with right hypochondrial

tenderness, 14.63% of them didn't have tenderness by the 3rd day and 87.8% of the patients by the 7th day.

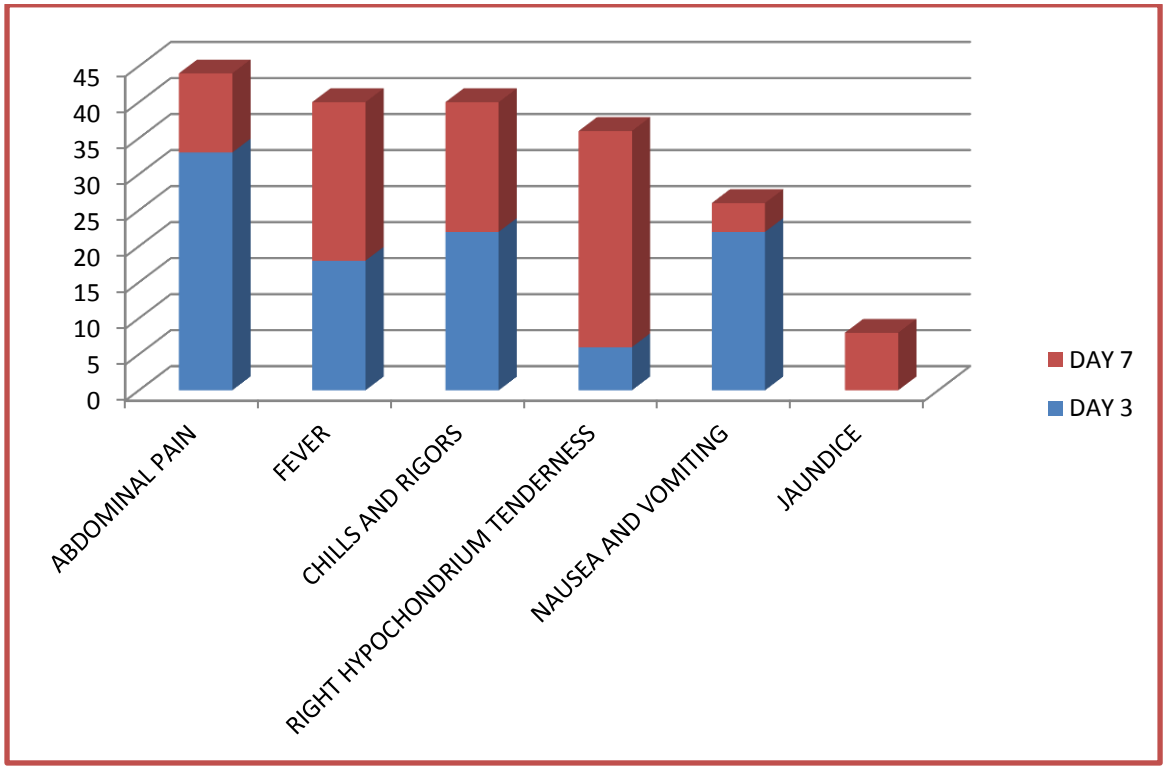


Fig 11: Association of resolution of symptoms post treatment (conservative and USG guided percutaneous/ catheter drainage)

Table 18: Association of mortality of the patients with the type of abscess.

MORTALITY	ALIVE	DEAD	TOTAL
AMOEBIC LIVER ABSCESSS (n- 31)	30	1	31
PYOGENIC LIVER ABSCESS (n- 19)	19	NIL	19
TOTAL	**49**	**1**	**50**

There was only one mortality for the entire duration of the study. The dead was from the amoebic liver abscess group.

DISCUSSION

Liver abscess has been a major health issue especially in a tropical country like India where, statistically, the prevalence of liver abscess has been quite high as compared to other developed countries. In the present study, a study population of 50 patients were made. The incidence in male sex was much higher as compared to the female sex in the ratio of 9:1, which is comparable to the other studies conducted. Out of the total 50 patients in our study, the most common symptom encountered was abdominal pain (96%) followed by fever which affected a total of 84% of liver abscess patient in our study. Fever was accompanied with chills and rigors in 80% of the study population. Incidence of right hypochondriac tenderness was presented in 82% off the patients and jaundice was present in 24% of the study population. Sharma et al reported jaundice in only 12.7% of cases[19] and Yoo et al in their study, compared data of patients between 1970s and 1980s and reported a fall in incidence of jaundice from 25% to 7% during this period.[21] Co-morbid conditions were evaluated and 38% of the study population had diabetes mellitus. A total of 16% of the patients reported with history of tuberculosis. And 84% of the population had a history of alcoholism.

In this study, the most commonly affected age group belonged between 31 – 50years of age (28%) and 51 – 60 years (24%) of age. Amoebic liver abscess were more commonly encountered in young adults and pyogenic liver abscess in the older age groups. In Indian scenario, amoebic liver abscess is predominantly a disease of young alcoholics, therefore the prevalence of liver abscess is more in younger age group as amebic liver abscess is more commonly encountered in India. In western countries, studies have shown that pyogenic liver abscess involving the older age groups are more common.

The study showed that most patients had elevated total leukocyte counts (68%) and elevated alkaline phosphatase in 20% of the total population. Out of the 50 patients, Pyogenic liver abscess accounted for a total 38% (19) of patients, out of which 57.89% (11) of patients showed growth in culture. The most common organism was E. coli (45.45%) followed by Klebsiela (27.27%).

Amoebic liver abscess accounted for 62% (31) of the total patients. The study conducted by Jayakar SR et al showed that 61.81% of patients had amoebic liver abscess and 38.18% of the study population had pyogenic liver abscess.[5]

So the result of the present study is similar to their result which shows that amoebic liver abscess is more prevalent than pyogenic liver abscess in the Indian subcontinent. As a tropical subcontinent, the poor living conditions and hygiene in the developing countries, more patients are affected through the feco-oral route and presents with amoebic liver abscess. In temperate and developed countries, the pyogenic liver abscess is comparatively higher.

For imaging studies, we did Ultrasonography of abdomen and pelvis to identify the part of the liver affected and also the number of abscess involved.

And when USG was inconclusive, CT scan was done to come to a diagnosis, The results were that in amoebic liver abscess, from among the total number of single liver abscess, 61.90% (26) of the patients had single liver abscess and pyogenic liver abscess accounted for 38.10% (16) of the single liver abscesses.

In multiple abscess, the amoebic liver abscess accounted for 62.50% (5) of the total and pyogenic liver abscess was responsible for 37.50% (3) of the total multiple liver abscess. In amoebic liver abscess, in 25 (80.64%) patients involved the right lobe. The left lobe was

involved in 5 (16.12%) patients and both lobes were involved in 1(3.2%) patient. In pyogenic liver abscess, right lobe is involved in 14 (73.68%) patients and left lobe was involved in 3 (15.80%) patients. Both lobes were involved in 2 (10.53%) patients of pyogenic liver abscess type. In a study conducted by Mohit Bhatia et al,[22] the right lobe was involved in 88% of the study population and 10% of the patients involving the left lobe. Both lobes were involved in 2% of the population. Our study also gave similar results with 78% of the patients with only the right lobe involved and 16% involving the left lobe only. In 6% of the patients, both lobes were

involved. Ultrasound abdomen is the investigation of choice for liver abscess as it can localize the abscess and hepatic vasculature. Also the specific segment involved can also be demonstrated with the help of an ultrasound. In our study, segment VII of right liver was most commonly involved.

As per the latest management strategy for liver abscess and the protocol of the hospital, the liver abscesses were segregated according to their size and number and the involvement of lobe. Those with size smaller than 5 cm was treated conservatively first with antibiotics. Metronidazole 500mg intravenous thrice daily was administered for amoebic liver abscess and a broad spectrum antibiotic was given for

pyogenic liver abscess till the culture reports were made available. Third generation cephalosporin was the most commonly used drug.

Those patients that did not respond to antibiotics or those with size larger than 5cm or those with multiple liver abscesses were subjected to ultrasound guided percutaneous aspiration or catheter drainage. Most of the patients responded to the management and showed alleviation of symptoms. Those that didn't respond or had impending rupture were subjected to open surgical drainage.

In our study, a total of 8 (16%) patients received conservative management only and showed resolution of symptoms. Among them 6 (75%) were of amoebic liver abscess and 2 (25%) were of pyogenic liver abscess. Due to persistence of symptoms in spite of medications or dude to larger size of the abscess or due to multiple abscesses, 39 (78%) patients were subjected to ultrasound guided percutaneous aspiration or catheter drainage and responded to the treatment with resolution of symptoms. Among those 39 patients, 23 patients belonged to the amoebic category and 16 patients belonged to pyogenic liver abscess category. Only 3 (6%) of the total study population underwent open surgical drainage due to failure of treatment via multiple (at least 3) percutaneous drainage under ultrasound guidance or catheter drainage. Of which, 2

(66.67%) belonged to amoebic type and 1 (33.33%) belonged to pyogenic type. Our findings are near identical with the study done by Soumik Ghosh et al,[18] in which 79% of the patients underwent percutaneous needle aspiration among which 4% underwent open drainage due to rupture.

The outcome of the treatment was evaluated based on the improvement of the patients symptomatically and resolution of the disease as well as mortality of the patient. The symptomatic improvement were assessed on the 3rd and 7th day post treatment and compared. In about 68.75% (33) of patients with abdominal pain (n - 48) responded positive to treatment on the 3rd day itself and a total of 91.67% (44) were free of the symptom by the 7th day. Out of a total 42 patients that presented with fever, 42.85% (18) of patients had no fever by the 3rd day and 95.23% (40) of patients had no fever by the 7th day of treatment.

Those that presented with chills and rigors, all the patients had resolution of symptoms by the 7th day and also those with nausea and vomiting. The patients with right hypochondrial tenderness (n – 41), 14.63% (6) had no more tenderness by the 3rd day while 87.80% (36) had no tenderness by the 7the day.

No patients were resolved off Jaundice (n – 12) by the 3rd day and 25% (3) of the patients symptomatically improved by the 7th day. Only one patient of amoebic liver abscess group, who under open surgical

drainage died during the course of this study. Hence the total mortality of the study was 1, which showed increased mortality risk associated with open surgical drainage.

CONCLUSION

This study had a total of 50 patients for a period of one year. Male gender was the most commonly involved sex with young adults being the commonly affected age group. Liver abscess was uncommon in females. Here, abdominal pain with fever and right hypochondrial tenderness was the most common presenting symptoms. Jaundice was not commonly seen in this study. Most patients had elevated total blood counts, and anemia with elevated liver enzymes were occasionally encountered. Patients with history of alcohol was one of the important risk factors. Other risk factors could not be assessed due to small sample size. Amoebic liver abscess was more commonly encountered as compared to pyogenic liver abscess with right lobe being the predominant lobe affected. Multiple liver abscesses were uncommon. Ultrasonography was the preferred method of imaging for liver abscess. In pyogenic liver abscess, Escherichia coli is the most common organism identified. Conservative management was attempted in few solitary abscess which were smaller in size and the response was variable. Those not amenable to conservative management should undergo ultrasound guided percutaneous aspiration or catheter drainage.

Most patient responded well to percutaneous aspiration and hence should be the treatment of choice for liver abscess. Finally, those patients not improving with percutaneous drainage were subjected to open surgical drainage, from among which one patient died.

Hence, individualization and personalization of management of each patient with percutaneous aspiration under ultrasound guidance as the first line of management in those where aspiration is indicated, should be the preferred line of management as it has shown better outcome with less morbidity and no mortality in our study.

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PATIENT PROFORMA

NAME

AGE

SEX

OCCUPATION

ADDRESS

MARITAL STATUS

PHONE NO.

Chief Complaints :

H/O Presenting Illness:

Past history

Personal history

Family history

Treatment history

EXAMINATION:

GENERAL EXAMINATION

B.P. –

P.R. –

TEMP -

SYSTEMIC EXAMINATION

CNS:

CVS:

RS :

P/A:

INVESTIGATIONS

CBC, RFT, SERUM ELECTROLYTES, LFT, PT/INR

RADIOLOGICAL INVESTIGATIONS

CHEST X-RAY, ULTRASOUND ABDOMEN AND PELVIS

CT SCAN

TREATMENT

CONSERVATIVE

ULTRASOUND GUIDED PERCUTANEOUS ASPIRATION/ CATHETER DRAINAGE

OPEN SURGICAL DRAINAGE

OUTCOME

KEYS TO MASTER CHART

CODE	SEX
1	MALE
2	FEMALE

CODE	ALCOHOL
1	NO
2	YES

CODE	DIABETES
1	NO
2	YES

CODE	TYPE OF ABSCESS
1	AMOEBIC LIVER ABSCESS
2	PYOGENIC LIVER ABSCESS

CODE	SITE OF ABSCESS
1	RIGHT LIVER
2	LEFT LIVER
3	BOTH

CODE	NUMBER OF ABSCESS
1	SINGLE
2	MULTIPLE

CODE	TREATMENT MODALITIES
1	CONSERVATIVE
2	USG GUIDED PRCUTANEOUS ASPIRATION/ CATHETER DRAINAGE
3	OPEN SURGICAL DRAINAGE

CODE	ORGANISMS ISOLATED
0	NO ORGANISM

1	ESCHERICHIA COLI
2	KLEBSIELLA
3	PROTEUS
4	STAPHYLOCOCCUS

CODE	FEVER
0	NO
1	YES

CODE	ABDOMINAL PAIN
0	NO
1	YES

CODE	CHILLS AND RIGORS
0	NO
1	YES

CODE	RIGHT HYPOCHONDRIAL TENDERNESS
0	NO
1	YES

CODE	NAUSEA AND VOMITING
0	NO
1	YES

CODE	JAUNDICE
0	NO
1	YES

CODE	WEIGHT LOSS
0	NO
1	YES

CODE	LEUCOCYTOSIS
0	NO
1	YES

CODE	HYPRBILIRUBINEMIA
0	NO
1	YES

CODE	RAISED UREA
0	NO
1	YES

CODE	RAISED CREATININE
0	NO
1	YES

CODE	RAISED ALP
0	NO
1	YES

CODE	INCREASED SGOT
0	NO
1	YES

CODE	INCREASED SGPT
0	NO
1	YES

CODE	INCREASED INR
0	NO
1	YES

AGE	SEX	ALCOHOL	DIABETES	TYPE OF ABSCESS	SITE OF ABSCESS	NUMBER OF ABSCESS	TREATMENT MODALITIES	ORGANISM ISOLATED	FEVER	ABDOMINAL PAIN	CHILLS AND RIGORS	RIGHT HYPOCHONDRIAC TENDERNESS	NAUSEA AND VOMITTING	JAUNDICE	WEIGHT LOSS	HAEMOGLOBIN	LEUCOCYTOSIS	ESR	HYPERBILIRUBINEMIA	RAISED UREA	RAISED CREATININE	RAISED ALP	INCREASED SGOT	INCREASED SGPT	INCREASED INR
28	1	2	1	2	1	1	1	0	1	1	1	1	1	1	0	12.9	0	26	0	0	0	1	0	1	1
55	1	1	1	1	1	1	2	0	1	1	1	1	0	0	0	12.6	1	10	0	0	0	0	0	0	0
75	1	1	2	2	3	1	2	2	1	1	1	1	1	0	0	10.5	0	28	0	0	0	0	0	0	0
46	1	1	2	1	1	1	2	0	1	1	1	0	0	1	0	13.1	1	18	1	1	0	1	0	0	0
59	1	1	1	2	1	1	2	1	1	1	0	1	1	0	0	11.2	0	42	0	0	0	0	0	0	0
37	1	2	2	1	1	2	3	0	0	1	0	1	0	0	0	10	1	16	0	0	0	0	0	0	0
26	1	2	1	2	2	1	2	1	1	1	1	1	1	1	1	14.2	0	15	0	0	0	1	1	1	1
45	1	1	1	1	2	1	1	0	1	1	1	1	0	0	0	13.9	1	12	1	1	0	0	0	0	0
48	1	2	1	2	1	2	2	3	1	1	1	1	0	0	0	12	0	10	0	0	0	0	0	0	0
33	1	1	2	1	1	1	2	0	1	1	1	1	1	0	0	13.7	1	5	0	0	1	0	0	0	0
48	1	2	2	1	1	1	2	0	1	1	0	1	1	1	0	11.9	1	71	0	0	0	1	0	1	1
39	1	1	1	1	1	1	2	0	0	1	0	0	1	0	0	13.7	0	18	1	0	0	0	0	0	0
38	1	1	2	2	3	1	2	3	1	1	1	1	1	0	0	10.2	0	12	0	0	0	0	0	0	0
55	1	1	2	1	1	1	1	0	1	1	1	1	0	0	0	14.8	1	22	0	0	0	0	0	0	0
38	1	1	1	1	1	1	2	0	1	0	1	1	1	0	0	15	1	14	1	0	0	0	0	0	0
32	1	1	2	1	1	1	2	0	1	1	1	0	0	0	0	15.5	1	20	0	0	0	0	0	0	0
52	2	1	1	1	2	1	2	0	0	1	0	1	0	0	0	9.4	0	17	0	0	0	0	0	0	0
47	1	2	2	1	1	2	2	0	1	1	1	1	1	0	0	12.9	1	15	1	0	0	0	0	0	0
26	1	2	1	2	1	1	2	0	1	1	1	1	1	1	1	15.7	1	28	0	0	0	1	1	1	1
28	1	1	1	1	1	1	2	0	1	1	1	1	0	0	0	11.9	0	14	0	0	0	0	0	0	0
33	1	1	2	1	1	1	1	0	1	1	1	1	0	0	0	7.8	1	18	1	0	1	0	0	0	0
41	2	2	2	2	1	1	2	0	0	1	1	1	0	0	0	14.8	1	10	0	1	0	0	0	0	0
68	1	1	1	1	3	1	3	0	1	1	1	1	0	0	0	14.9	1	5	0	0	0	0	0	0	0
28	1	1	2	2	1	2	2	4	1	1	1	1	0	0	0	13	1	8	1	0	0	0	0	0	0
32	1	1	2	1	2	1	2	0	1	0	1	1	1	1	0	13.8	1	32	0	1	0	1	0	0	0
44	1	2	1	1	1	1	2	0	1	1	1	0	1	0	0	14.6	0	6	0	0	0	0	0	0	0
53	1	2	1	2	1	1	2	1	1	1	0	1	0	0	0	7.2	1	22	0	0	0	0	0	0	0
61	1	2	2	2	1	2	2	2	1	1	1	1	0	1	0	15.2	1	34	1	0	0	1	0	1	0
59	1	1	2	2	1	1	2	0	1	1	1	1	0	0	0	15.1	1	14	0	0	1	0	0	0	0
37	1	1	2	1	1	1	2	0	0	1	0	1	1	0	0	16	0	76	0	0	0	0	0	0	0
60	1	2	1	1	1	2	2	0	1	1	1	0	0	0	0	13.8	1	6	0	0	0	0	0	0	0
31	1	2	1	2	2	1	1	1	1	1	1	1	0	0	0	13.9	1	18	0	0	0	0	0	0	0
35	1	1	2	1	2	1	2	0	1	1	1	1	0	1	0	12.8	0	46	0	1	0	1	1	1	1
58	1	1	1	1	1	1	2	0	1	1	1	1	0	0	0	8.8	1	19	0	0	1	0	0	0	0
67	2	2	2	2	2	1	2	0	1	1	1	1	1	0	0	15	1	26	0	0	0	0	0	0	0
45	1	1	2	1	1	1	1	0	1	1	1	0	1	0	0	14.8	1	7	0	1	0	0	0	0	0
55	1	1	1	2	1	1	3	0	1	1	1	1	1	0	1	14.2	1	36	0	0	0	0	0	0	0
32	1	1	1	1	1	1	2	0	1	1	1	1	0	0	0	10.2	0	8	0	0	0	0	0	0	0
42	1	1	2	1	1	1	2	0	0	1	0	0	1	1	0	13.4	1	16	0	0	0	1	1	1	1
60	1	2	2	2	1	1	2	0	1	1	1	1	0	0	0	12.7	0	42	0	1	0	0	0	0	0

56	1	1	2	1	1	1	2	0	1	1	1	1	1	0	0	14	0	14	0	0	0	0	0	0
64	1	1	2	1	1	2	2	0	1	1	1	0	1	0	1	13.8	1	22	0	0	0	0	0	0
33	1	2	2	2	1	1	1	1	1	1	1	1	0	0	0	13.4	1	13	0	0	0	0	0	0
23	1	2	1	2	1	1	2	0	0	1	0	1	1	1	0	12.9	0	40	0	1	1	0	0	0
38	2	1	2	2	1	1	2	2	1	1	1	1	1	0	0	8.4	1	10	1	0	0	0	0	0
55	1	1	2	1	1	1	1	0	1	1	1	1	1	1	0	11.8	1	11	0	0	0	1	0	1	1
50	1	1	2	1	1	1	2	0	1	1	1	1	1	0	0	14.6	1	62	0	0	0	0	0	0	0
38	1	2	2	1	2	1	2	0	0	1	0	0	1	0	0	15.2	0	12	0	0	0	0	0	0	0
50	2	1	2	1	1	2	2	0	1	1	1	1	1	1	0	15.7	1	14	1	0	0	0	0	0	0
55	1	1	2	1	1	1	2	0	1	1	1	0	0	0	0	14.1	1	18	0	0	0	0	0	0	0