

Original Research Article

A STUDY OF INCIDENTAL FINDINGS OF MEDIAN ARCUATE LIGAMENT SYNDROME DETECTED ON EMERGENCY COMPUTED TOMOGRAPHY OF ABDOMEN

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ABSTRACT

Introduction: The use of computed tomography (CT) has substantially increased in the emergency setting due to its better availability. Consequently, with increased and frequent use of CT there has been a rise in detection of number of incidental pathologies including congenital anomalies or variations. Median Arcuate Ligament Syndrome (MALS) is one such entity detected majority of the times incidentally on CT abdomen. The purpose of our study is to know the incidental finding of MALS in our University teaching hospital.

Methods and Results: A retrospective review of all emergency CT abdominal scans done during the year 2015 at KLES Dr Prabhakar Kore Hospital and MRC, Belagavi was examined. There were total 135 patients who had an emergency abdominal CT scan of which 76 (56%) had some definitive pathology which can be clinically correlated with the history of patient. 18 (13%) incidental findings detected, of which 4 (3%) were deemed to have MALS. Out of 4 MALS cases 2 cases were associated with other abdominal pathologies. One case was associated with pancreatitis and another case was associated with intramural hemorrhage of jejunum.

Conclusion: Sometimes MALS can be associated with other abdominal pathology as detected in our study and reporting of such association will be more helpful to treating surgeons and clinicians. There is a need for larger clinico-radiological and anatomic cadaveric dissection type of studies to know the incidence of MALS in general population.

KEY WORDS: Median Arcuate Ligament Syndrome, Coeliac trunk, Abdominal Pain, Computed Tomography.

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INTRODUCTION

In the current era of advanced health care facilities in terms of availability of advanced imaging modalities such as computed tomography (CT), the use of CT has substantially increased in the emergency setting. Consequently, with increased and frequent use of CT there has been a rise in detection of number of incidental pathologies including congenital anomalies or variations. Acute severe abdominal pain and chronic abdominal pain are the two common symptoms for which CT abdomen is advised. Anatomical variations of coeliac trunk and its branching pattern uncommonly found during cadaveric dissection and radiological imaging have been reported by numerous authors. The median arcuate ligament (MAL), the fibrous arch that unites the diaphragmatic crura on either side of the aortic hiatus has a low insertion point and may distort and compress the coeliac trunk, which is known as Median Arcuate Ligament Syndrome (MALS). Although commonly MALS is asymptomatic, it may cause ischaemic-type epigastric pain. Extrinsic compression of the coeliac trunk by the median arcuate ligament (MAL) occurs in 10-24% of patients [1]. Although this compression may lead to clinical manifestations of postprandial epigastric pain, nausea or vomiting, and weight loss, it is usually asymptomatic, presumably due to collateral supply from the superior mesenteric circulation [1,2]. MALS is an uncommon entity but it should be kept in mind in the presence of unexplained gastrointestinal symptoms. CT abdomen is minimally invasive and plays a dominant role in the diagnosis of MAL compression [3].

The aim of this study is to examine the incidence of incidental findings of MALS in emergency CT abdomen done for patients who had come with abdominal pain to our tertiary care university Hospital, as MALS is majority of the times an imaging diagnosis detected incidentally along with or without other abdominal pathologies.

MATERIALS AND METHODS

A retrospective review of all emergency CT abdominal scans done during the year 2015 at the KLE university teaching hospital KLES Dr Prabhakar Kore Hospital and MRC was

examined. Institutional ethical Review Board permission was obtained for this retrospective review study. Our aim was to determine the incidence of MALS as an incidental finding detected in CT abdomen reports. There is no definition for term "emergency CT abdomen" but for our study purpose it was demarcated as a CT scan of abdomen done for abdominal pain, within 24 hours of admission or sent from surgical or gastroenterology OPD. All CT scans of abdomen with oral and intravenous contrast were done with prior informed consent of the patient.

There were total 135 patients who had an emergency abdominal CT scan of which 76 (56%) had some definitive pathology which can be clinically correlated with the history of patient. 18 (13%) incidental findings detected, of which 4 (3%) were deemed to have MALS [Figure.1,2,3]. Any findings on CT scan that were not related to the chief complaint were considered "incidental findings." Out of 4 MALS cases 2 cases were associated with other abdominal pathologies. One case was associated with pancreatitis and another case was associated with intramural haemorrhage of jejunum. 2 other cases were without any other significant pathology in abdomen. All the patients were in age group of 30 to 60 years. 3 patients were male one was female. The remaining majority of incidental findings were benign in nature.

Fig. 1 (a) & (b): Cross section C T Abdomen Showing Coeliac Artery Compression.

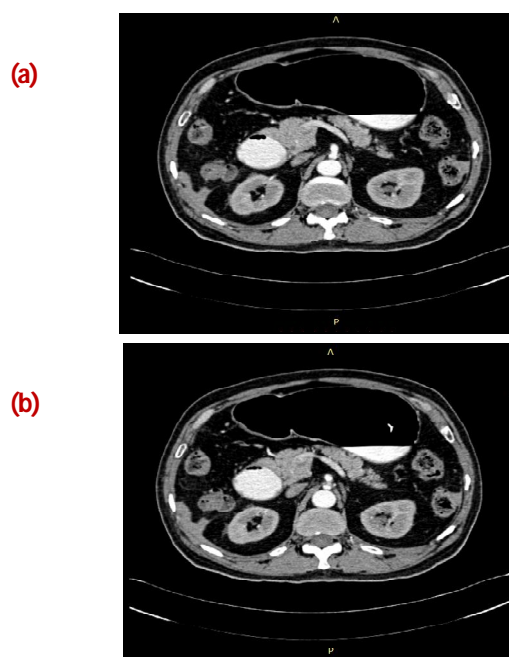


Fig. 2 (a) & (b): Sagittal section C T Abdomen Showing Coeliac Artery Compression.

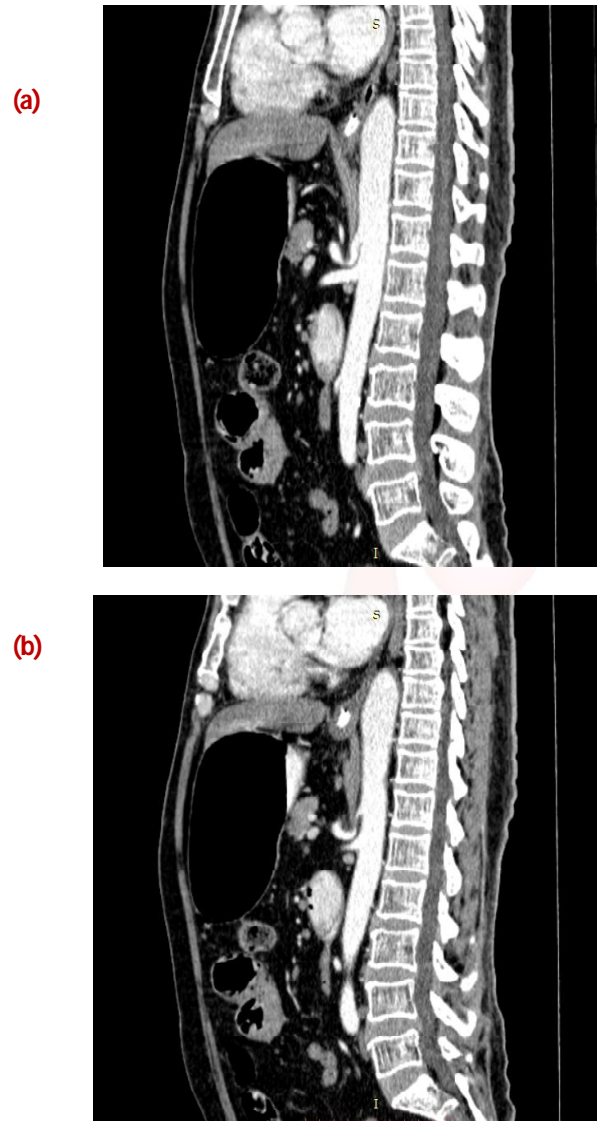
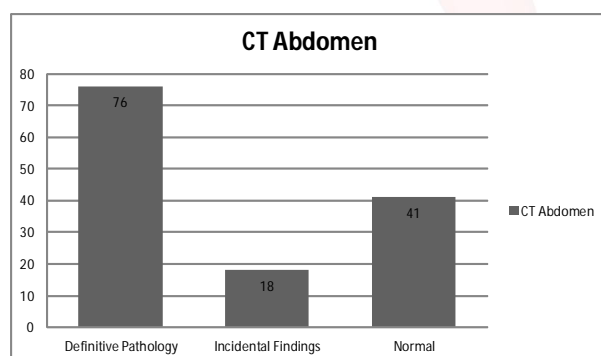


Fig. 3: Details of Studied CT Abdomen.



DISCUSSION

The better availability and usage of CT scans in the emergency department of many institutions has been well documented [4]. Furthermore, the advances in technology of the CT scan have also increased the resolutions and abilities of The better availability and usage of CT scans in the emergency department of many institutions

has been well documented [4]. Furthermore, the advances in technology of the CT scan have also increased the resolutions and abilities of radiologists in picking up many more subtle findings. While some of these incidental findings are benign and require no follow-up, others require serial imaging and close supervision of the patient by their primary care physician [5]. Few previous studies have examined rates of incidental findings in trauma patients, a group that undergo more number of CT scans in their workup [6 -9] and renal colic patients [10]. Rates of incidental findings varied from 34% to 43% on abdominal CT scans in trauma patients [6, 7, 9], and up to 45% in renal colic ED patients [10].

However, no study has ever examined systematically the rates of incidental findings across all emergency CT scans of abdomen in a patient population. Our goal was focused to explore the detection of MALS as incidental finding in patients who have undergone emergency CT scans of abdomen. Our focus on detection of MALS was with following intentions. The awareness of MALS among clinicians is very low and hardly MALS is ever considered in differential diagnosis of abdominal pain. Rarely clinicians subject a patient to undergo CT abdomen with clinical suspicion of MALS and also many patients would have already undergone basic evaluation such as ultrasonography and endoscopic procedures which usually don't detect MALS. So, majority of the times MALS is a radiological imaging diagnosis especially by CT abdomen. Sometimes, MALS is detected incidentally in a patient who has undergone CT abdomen for trauma or other non-abdominal pain conditions that indicates that MALS can be present without any symptoms. Therefore we just reviewed CT abdomen done in our hospital to know the finding of MALS.

Median arcuate ligament syndrome (also known as celiac artery compression syndrome or Dunbar syndrome) was first described by Harjola in 1963 [2]. The median arcuate ligament is a fibrous arch that unites the diaphragmatic crura on either side of the aortic hiatus. The ligament usually passes superior to the origin of the celiac artery near the first lumbar vertebra. In

the general population, 10-24% of people may have indentation caused by an abnormally low ligament [2]. Few of these patients have hemodynamically significant stenosis that would cause symptoms. The pathophysiology of MALS is abnormally low lying ligament causing external compression of the celiac artery, which worsens with expiration as diaphragm moves caudally during expiration. This compression leads to visceral ischemia and postprandial abdominal pain. Few claim that this causes a steal phenomenon from blood flow being diverted away from the superior mesenteric artery via collaterals to the celiac axis, causing midgut ischemia [11]. The etiology of this compression is not clear. However, it is thought to be due in part to the variable migration of the celiac trunk origin during embryogenesis. Thony et al. [12] have suggested that these compressions are not congenital but may be favored by changes in the relationships between the aorta and musculoskeletal structures over time. Overstimulation of celiac ganglion is also believed to cause chronic pain in these patients. Constant compression of the celiac axis may lead to changes in vascular layers such as intimal hyperplasia, proliferation of elastic fibers in media, and disorganization of adventitia.

Patients are usually young thin women between the ages of 30 and 50 and typically have undergone extensive workups for diagnosis of abdominal pain [11]. Pain is localised to epigastric area and worsens after meals, with exercise, or with leaning forward. The pain is also associated with nausea, emesis, bloating, and diarrhea. Patients may get transient relief of these symptoms by bringing their knees to their chest. This position decreases impingement of the arcuate ligament on the celiac artery by pushing it cephalad relative to the artery as expiration does. Epigastric pain may be present, and physical examination may reveal epigastric bruit in as many as 83% of patients [11]. This bruit may increase on expiration.

The observation of 4 MALS cases detected in our study, 2 cases found to have concomitant other abdominal pathology. One case in which a 62-year-old man with past medical history of acute pulmonary embolism treated successfully

3 months back and was on anticoagulation treatment, presented to the hospital with history of intermittent epigastric abdominal pain and malena. The CT abdomen revealed intramural hemorrhage of proximal jejunum along with MALS [Figure. 4], which is also very rare condition and also rarest association. In another case 45 year old male MALS detected concomitant with pancreatitis. The importance of knowing such association is important in terms of clinician's point of view. There is no reporting of such concomitant cases and their management.

Fig. 4: Concomittant pathology- Intramural Hemorrhage in proximal Jejunum.



There are few studies done in past, where 75 fresh autopsy specimens were studied and analyzed relative to the relationship between the MAL and the celiac artery, the celiac plexus, and the inferior phrenic arteries. The following observations were made: (1) celiac ganglionic cuirass often participates in arterial compression, (2) celiac artery origin was at or above the median arcuate ligament in up to 25 (33%), (3) this was due to a low ligament rather than a high artery [13]. In another study, 46 cadaveric specimens were dissected to study the anatomical relations between the MAL, the celiac ganglion, and the origin of both the celiac and superior mesenteric arteries. We found that in 40 cases (87.5%) both vessels were held together by the ganglionic mass, and in 90.6%, the celiac trunk was covered, either partially or completely, by the MAL. These data indicated that this is a normal occurrence. In 10% of the cases both vessels were covered by the MAL. These anatomical findings are in correla-

tion with the understanding of MALS [14]. There are many anatomical variations in coeliac trunk, which have been reported in cadaveric dissection studies [15]. Surgical median arcuate ligament release has been the mainstay of treatment which can be accomplished either open or laparoscopically. The largest follow-up series of open surgical patients was done in 1984 by Reilly et al.[16].

CONCLUSION

There is a need for larger clinico-radiological and anatomic cadaveric dissection type of studies to know the incidence of MALS in general population. Sometimes MALS can be associated with other abdominal pathology as detected in our study and reporting of such association will be more helpful to treating surgeons and clinicians.

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Conflicts of Interests: None

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