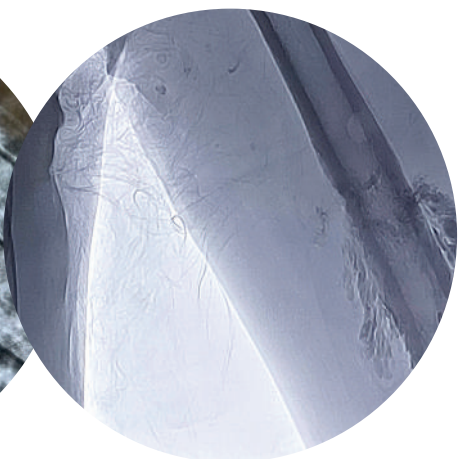
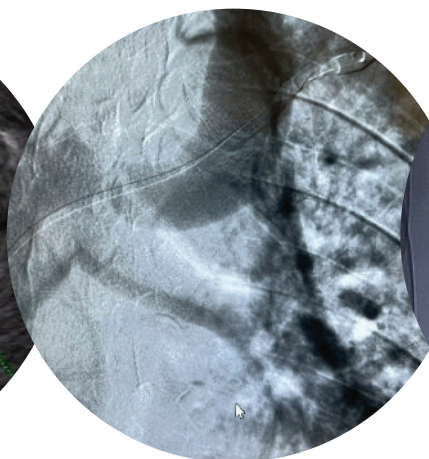
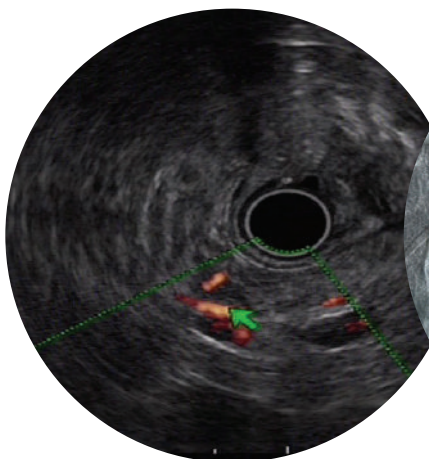




# Dhulikhel Medical **UPDATE**



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## Foreword

Dhulikhel Hospital (DH) was founded with the noble vision of 'Quality Health Care to All'. Since its conception it has held firm to its notion that 'care' should be the foundation of health sciences. To enhance, sustain and promote quality care, we need the elements of capacity building and research. We steadily started and strengthened our engagements in these areas, and have established DH as a hub for some of the noble, competitive and acclaimed academic and training programs in health sciences. We are also making significant progress in research and currently serve as one of the largest health research institutions in the country. All of our efforts have been pursued and fulfilled through our partnerships with the Government of Nepal, national and international institutions, universities, individual experts and others have been a central asset in these endeavors.

Dhulikhel Medical Update (DMU) has been conceived to provide a significant contribution to evidence based learning in health sciences. It will serve as the epitome of our fundamental values, commitment to quality, relentless effort to excellence, and pursuit of knowledge, innovation and discovery. I firmly believe that this will foster and advance scientific discourses and take the genuine deeds of health sciences community to newer heights. I applaud our team that has worked extensively for its creation and also thank our collaborators nationally and internationally who are partnering and guiding in this effort. I have no doubt that its growth will align, if not supersede the speed of our institutional growth. I assure of full support to this effort and extend best wishes for its success.



**Dr. Ram KM Shrestha, MD**  
Executive Director  
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# Editorial

## **Evidence based medicine: bridging the gap between research and service.**

The Editorial team, Dhulikhel Medical Update.

Although the term “Evidence based medicine” was coined in 1990, the medical field has been subject to continuous modification based on new evidence for a long time.<sup>1</sup> The traditional approach led to many intuitive biases resulting in variable treatment options around the globe. Practice based on established evidence will help in appropriate clinical decision making. As health care practitioners, it is imperative to practice the principles of evidence based medicine.

Observation from day to day work builds the knowledge and gives guides for addressing similar medical problems. However, properly conducted research works will solidify the evidence such that extremely minute details can also be addressed. Research and publication will also help disseminate the imparted knowledge in the global community increasing the reach of the experience to the desired target group. “Publish or perish” has been a popular dictum to the medical personnels who are involved in the scientific research field.

To provide the most effective care owing to the best treatment available is the theme of evidence based medicine. Nevertheless, lots of research is available in the literature and not all evidence is of sufficient quality to make sound clinical decisions. Medical personnel should update their knowledge based on best available research publication and also should contribute to the science by being part of the research works that they can contribute. Dhulikhel Medical Update is a new venture to be a small but a significant part of the evidence based medicine and we would like to urge all health care personnel to contribute on their part so that much improvement in health care delivery can be achieved.

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# Insulinoma: Case Report of a Rare Neuroendocrine Tumor

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## Abstract

### Background

Insulinomas are neuroendocrine tumours of pancreatic origin causing excessive release of insulin that results in recurring episodes of hypoglycemia. With a prevalence rate of up to 4 people per million, these tumours are quite rare, with no cases reported in Nepal. Therefore, a report on this case can guide clinicians in the future when they come across a similar condition in making a diagnosis and planning the treatment course.

### Case Presentation

We report a case of a 34-year-old male with insulinoma presenting with complaints of dizziness, sweating, and palpitation who was managed successfully with surgical enucleation of the tumour resulting in the resolution of the symptoms.

### Conclusions

Insulinoma may present with non-specific findings that could result in underdiagnosis. A history of recurrent neuroglycopenic symptoms along with markedly increased levels of insulin should raise suspicion of insulinoma and imaging modalities like Endoscopic Ultrasonography (EUS) in conjunction with Magnetic Resonance Imaging (MRI) should be performed for appropriate management.

**Keywords:** Case Report, Endoscopic Ultrasonography, Hypoglycemia, Insulinoma.

## Introduction

Endocrine cell tumours of the gastrointestinal tract can be classified histologically as either carcinoids or endocrine tumors.<sup>1,2</sup> Insulinoma is usually a benign and solitary tumour of the pancreas which can occur both sporadically or in conjunction with Multiple Endocrine Neoplasia Type<sup>1</sup> (MEN1) syndrome.<sup>3</sup> Insulinomas associated with MEN1 syndrome are often multicentric and develop earlier than sporadic insulinomas.<sup>3</sup> They are characterized by features of hypoglycemia including forgetfulness and altered consciousness along with clinical features of sympathetic overstimulation like sweating, tremors, palpitations, and hyperphagia.<sup>3,4</sup>

These episodes are exacerbated following exertion, fasting, or even after meals.<sup>5</sup> Herein, we present a case of a 34 years old male diagnosed with insulinoma with good clinical outcome following treatment.

## Case Report

We report a case of a 34-year-old male who presented to the Emergency Department of Dhulikhel Hospital in October 2022 with complaints of dizziness, sweating, and palpitation which got resolved shortly after by intake of sweet food like chocolate. The patient added that he experienced similar bouts of symptoms more than 5 times within a month with each event lasting

for nearly an hour after having dinner. The documented value of random blood sugar during each event ranged from 40-50 mg/dl.

On examination, the vitals were stable. However, the lab investigation findings were significant with markedly decreased blood glucose levels as suggested by the random blood sugar (RBS) of 45 mg/dl. The fasting blood sugar was 110 mg/dl, post-prandial blood sugar was 89 mg/dl, fasting insulin was 29.8  $\mu$ IU/ml, post-prandial insulin was 72.3  $\mu$ IU/ml, total bilirubin was 3.6mg/dl, and direct bilirubin was 0.2 mg/dl. On overnight fasting, fasting insulin was 100.7  $\mu$ IU/ml, fasting blood sugar was 100 mg/dl, and HbA1c was 5.1%. All other haematological and biochemical parameters were unremarkable. Endoscopic Ultrasonography (EUS) (Figure 1) showed an 8.4 mm hypoechoic lesion in the pancreatic neck body region suggestive of a tumour. To corroborate this finding, a dynamic MRI study was performed which illustrated a 9.4x7.5 mm size hypointense lesion in the neck of the pancreas (Figure 2).



Figure 1. EUS showing an 8.4 mm hypoechoic lesion (green arrow) in the pancreatic neck body

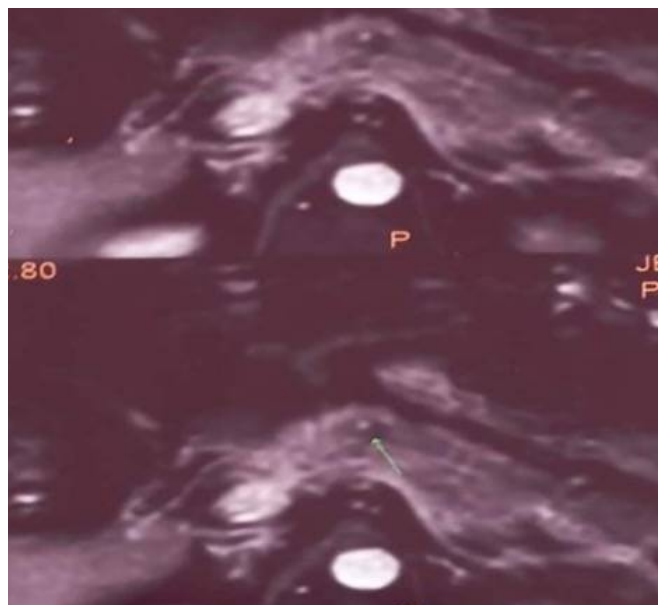


Figure 2. MRI showing a 9.4x7.5 mm size hypointense lesion in the neck of the pancreas

The patient underwent surgical exploration in a tertiary care hospital in Kathmandu. A small tumour was identified at the neck of the pancreas at the surgery. The complete enucleation of the lesion was performed and was sent for histopathological examination which was unremarkable.

Following the surgery, the neuroglycopenic symptoms and palpitation resolved. On a five-week follow-up, the fasting insulin was 27.3  $\mu$ IU/ml, fasting C-peptide was 5.1 ng/ml, and fasting blood sugar (FBS) was 102 mg/dl. After 3 months, a repeat EUS showed no obvious pathological changes apart from a scar resulting from the prior surgery (Figure 3).

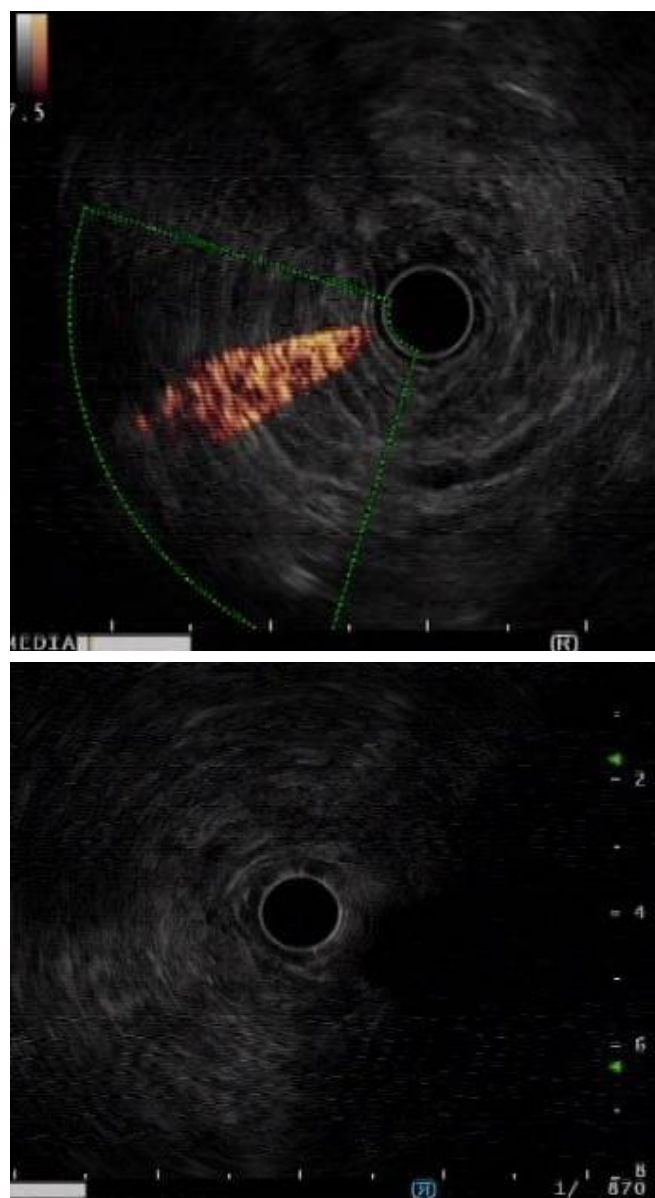


Figure 3. Repeat EUS showing homogenous pancreatic parenchyma with no obvious pathological changes.

## Discussion

Insulinomas are pancreatic neuroendocrine tumours that are derived from the pancreatic beta cells.<sup>5</sup> These tumors are the most common endogenous cause of



hyperinsulinemia having a prevalence of up to 4 people per million of the general population.<sup>5</sup>

Whipple's triad is a commonly used screening modality for diagnosing insulinoma and includes (1) hypoglycemia (plasma glucose < 50 mg/dL); (2) symptoms that are consistent with hypoglycemia; and (3) relief of symptoms following the administration of glucose.<sup>6</sup> For the indexed case, the diagnosis of an insulinoma met all three criteria of the triad. Laboratory investigations include the measurement of plasma glucose, insulin, and C-peptide, with the gold standard being the measurement of proinsulin in a 72-hour fast.<sup>5</sup> However, a normal insulin level does not rule out the condition.<sup>7,8</sup> In our case, the patient had a random blood sugar of 45 mg/dl, and preoperatively, fasting insulin was 29.8 µIU/ml, post-prandial insulin was 72.3 µIU/ml and on overnight fasting, the insulin was 100.7 µIU/ml with the fasting blood sugar 100 mg/dl. High proinsulin levels have been proposed as an insulinoma diagnostic marker regardless of concurrent blood glucose levels as the fraction of proinsulin produced by insulinoma cells is often larger than that secreted by normal cells.<sup>7</sup>

Transabdominal ultrasound, abdominal computed tomography (CT), magnetic resonance imaging (MRI), and endoscopic ultrasonography (EUS) are radiological investigations that can be done to localize the lesion.<sup>9</sup> EUS has a higher sensitivity than triple-phase MDCT scan in detecting pancreatic neuroendocrine tumors, notably for insulinomas. For lesions <2 cm, EUS aids in the detection of 91% of insulinomas missed by MDCT.<sup>10</sup> CT and MRI demonstrate characteristic lesions on imaging with MRI being generally better than CT scan.<sup>10,11</sup> Insulinomas exhibit more enhancement under contrast than normal pancreatic parenchyma because of hypervascularity.<sup>11</sup> A notable peculiarity in our case is that CT and MRI yielded normal results whereas EUS demonstrated the presence of a lesion. This goes to show the superiority of invasive modalities like EUS in diagnosing Insulinoma above non-invasive ones like CT and MRI.<sup>3,5</sup>

Conservative management of patients with insulinoma includes frequent meals and glucose infusion.<sup>12</sup> Somatostatin analogs are also shown to be effective as somatostatin receptors are expressed in the neoplastic cells.<sup>13</sup> Since this receptor is not universal, the outcomes may vary.<sup>13</sup> Additionally, long-acting somatostatin analogs are linked to aggravating hypoglycemia due to peripheral glucose utilization.<sup>14</sup> Thus, surgical management remains the mainstay treatment for insulinoma.<sup>5</sup> Owing to the range of techniques available for diagnosing the tumor, blind resection can be avoided.<sup>5</sup> Small, benign tumors that are at least 2-3 mm from the main pancreatic duct should be enucleated.<sup>9</sup> Resection is necessary when the tumor borders a major vascular or pancreatic duct, and in cases of infiltrating tumor puckering the nearby soft

tissue.<sup>9</sup> Depending on the location of the insulinoma, resection options include distal pancreatectomy, pylorus-preserving Whipple surgery, or mid-body pancreatectomy with laparoscopic resection gaining popularity.<sup>9</sup> In cases of malignant insulinomas, multiple approaches like resection of the pancreas and liver, liver transplantation, radiofrequency ablation, or chemoembolization may be essential.<sup>5,15</sup> In our case, enucleation was done specifically since we had a single lesion. On follow-up revealed normal pancreatic parenchyma with no pathological changes apart from the fibrosis resulting from the surgery.

Conclusively, any cases of recurrent neuroglycopenic symptoms should be thoroughly evaluated in suspicion of insulinoma to ensure early treatment and decrease the risk of malignant conversion.

## Conclusion

Insulinoma is a rare tumor, which presents with non-specific findings resulting in underevaluation. Thus, a history of recurrent neuroglycopenic symptoms along with markedly increased levels of insulin should raise suspicion of this disease. Endoscopic ultrasonography in conjunction with MRI should be performed for establishing the diagnosis and planning the treatment.

## Consent

Written informed consent was obtained ensuring patient's anonymity

## Declaration of competing interest

There are no conflicts of interest.

## Acknowledgement

N/A

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# Ruptured Aortic Pseudoaneurysm Secondary to Esophageal Perforation due to Chicken Bone Impaction: A Case Report

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## Abstract

### Background

Accidental foreign body impaction in older children and adults is rare. The patient with an esophageal foreign body usually presents with dysphagia, hypersalivation, choking sensation, retrosternal discomfort, and drooling. If left unremoved, the esophageal foreign body can lead to complications including perforation, aorto-esophageal fistula formation, and mediastinitis. Therefore, all impacted esophageal foreign bodies should be removed within 24 hours by urgent endoscopy to prevent risk of complications.

### Case Presentation

We present a case of a 15-years-old child with pseudoaneurysm of aortic arch with mediastinitis secondary to prolonged esophageal obstruction by a chicken bone.

### Conclusions

Aortic aneurysm caused by an esophageal foreign body is an extremely rare condition associated with high mortality and requires strict monitoring and comprehensive multidisciplinary care.

**Keywords:** Aortic arch pseudoaneurysm, Case report, Esophageal foreign body, Flexible endoscopy

## Introduction

Esophageal foreign bodies are an emergency condition that is frequently encountered by all age groups. Bone is the most prevalent esophageal foreign body in adults in Nepal, accounting for 91.4% of all cases.<sup>1</sup> Common symptoms include dysphagia, nausea/vomiting, odynophagia, and retrosternal discomfort.<sup>2</sup> Serious consequences, including neck abscess, esophageal perforation, mediastinitis, and artery and lung injury, may result from ingesting sharp-pointed items like bone with a sustained period of impact.<sup>3</sup> Here, we present a rare case of a patient who accidentally ingested a chicken bone and was complicated with esophageal perforation,

mediastinitis, and an aortic arch pseudoaneurysm that was effectively managed by multidisciplinary means of a combined endoscopic, medical, and endovascular treatment.

## Case Report

A 15-year-old male presented to the Emergency Department of Dhulikhel Hospital with a three-day history of epigastric pain radiating to the left hypochondrium that began a day after ingestion of a chicken bone. The patient added there is a sensation of something 'stuck' in the lower chest. The patient has

no history of dysphagia with odynophagia, hemoptysis, hematemesis, neck and chest pain, dyspnea, vomiting, or shortness of breath.

On examination, there was a raised temperature of 100.8 F with an epigastric tenderness on palpation. Following examination, pre-procedure investigations were done, and under general anesthesia upper gastrointestinal endoscopy was performed which revealed an impacted chicken bone in the mid-esophagus lying transversely. The foreign body was removed successfully (figure 1).

On the first postprocedure day, the fever persisted and the patient had complaints of epigastric pain which did not improve even with medications. The next day, the patient added that he had severe epigastric pain, which was followed by an episode of hematemesis of about 400 ml of fresh blood. An immediate radiological evaluation with chest contrast-enhanced computed tomography (CECT) was done. It revealed a contrast-filled outpouching of size 25\*13mm arising from the medial aspect of the arch of the aorta that was directed superomedially suggestive of a Pseudoaneurysm [Figure 2]. There was the presence of ill-defined hypodense collection with multiple air and foci on the left side of the middle mediastinum communicating with mid esophagus (corresponding to T3 vertebral level) through a suspicious mucosal breach.

The patient was immediately referred to another institution for intervention. An upper gastrointestinal endoscopy was done and mucosal ulceration was noted at 21 cm from the incisors. The cervical esophagus was mobilized and blunt dissection was carried up to the mediastinum during which an arterial bleed occurred. Gauze packing and median sternotomy were done during which about 500 ml of blood was lost. Median sternotomy revealed a bovine arch, a ruptured pseudoaneurysm of 1.5 cm in the medial aspect of the arch of the aorta noted, and the aorta was repaired under cardiac bypass, following which a cervical esophagostomy was done to mobilize the esophagus and an esophago-cutaneous fistula was made and a separate drain was placed. Finally, a midline laparotomy was done to create a feeding jejunostomy using a 12 Fr feeding tube.



Figure 1. Endoscopy revealing a slender and sharp chicken bone stuck in mid-esophagus transversely



Figure 2. CECT showing Contrast filled outpouching of 25\*13mm size arising from the medial aspect of the arch of the aorta and directed superomedially.

## Discussion

Accidental ingestion of foreign bodies in the gastrointestinal tract, most frequently in the form of fish, chicken, mutton, or buffalo bones in the adult population in Nepal <sup>1, 4</sup>. The cervical esophagus is most frequently affected by foreign bodies (57% of cases), followed by the thoracic (26% of cases), and the cardiac esophageal junction (17% of cases).<sup>5</sup>

Dysphagia, odynophagia, nausea/vomiting, and retrosternal pain are typical symptoms.<sup>2</sup> When consuming sharp-pointed solids like bone over a prolonged period of time, there are possibilities of serious outcomes such as mucosal ulceration, esophageal perforation, mediastinitis, vascular trauma, aorto-esophageal fistula, pseudoaneurysm, para esophageal abscess, tracheoesophageal fistula, pneumothorax, pericarditis, and other conditions which are associated with a high mortality rate.<sup>3, 6</sup> In our case the patient had esophageal perforations leading to pseudoaneurysms. Esophageal perforation is a life-threatening condition with a mortality rate as high as 20% and the mortality can double if treatment is delayed for longer than 24 hours <sup>7</sup>

The propensity of delayed diagnosis leading to these complications might be explained by the ambiguous



nature of the symptoms, the delay in seeking medical attention, and the low diagnostic value of plain radiographs<sup>3,6</sup>. Like in our case, the patient has no history of dysphagia with odynophagia, hemoptysis, neck and chest pain, dyspnea, vomiting, or shortness of breath. In order to prevent serious complications and shorten the recovery period, effective treatments should be given as soon as possible when items, particularly sharp, pointed, and big objects, are identified as esophageal foreign bodies.<sup>6</sup>

The diagnosis of a foreign body is based on the evaluation of history which includes the type of foreign body, the time it was consumed, and persistent symptoms. Physical examination and imaging are done for the confirmation of diagnosis as well as to localize and identify the foreign body.<sup>8</sup>

The size, form, quantity, and placement of a radio-opaque foreign body can be confirmed by plain radiographs (anteroposterior and lateral views from the neck, chest, and abdomen) however, food bolus, thin metal objects, wood, plastic, glass, as well as fish or chicken bones, are not easily seen.<sup>8-9</sup> Bones and glass may not be seen on x-rays. If nothing is seen on routine x-rays, but suspicion of a foreign body remains high, then diagnostic endoscopy or CT scan may be indicated. CT scans have a high sensitivity for detecting foreign bodies plus are useful for detecting complications such as perforation. Initially, a simple radiograph can be used. However, it may not reveal the presence of bones and glass. A diagnostic endoscopy or a CT scan may be recommended if nothing is visible on normal x-rays but the suspicion of a foreign body is still high.<sup>10</sup> In emergency conditions, imaging is not required in adult patients with suspected esophageal obstruction brought on by ingesting a foreign material, and it should not postpone prompt endoscopy.<sup>10</sup>

Upper endoscopy should be the first option for suspected esophageal foreign bodies because it allows for simultaneous diagnosis and retrieval.<sup>11</sup> Similarly, in our case we performed pre-operative investigations followed by flexible endoscopy and removal of impacted chicken bone from mid-esophagus. In comparison to the rigid instrument, the flexible upper endoscope provides a number of benefits, such as built-in suction, air insufflation, magnification, the capacity to view the stomach and duodenum, and the absence of a requirement for general anesthesia.<sup>12</sup> Keeping the benefits in mind, we performed flexible endoscopy in our case. CT imaging is a quick and efficient way to see the pseudoaneurysm and its supporting components.<sup>13</sup> However, in our case, we performed CECT which revealed a contrast-filled outpouching arising from the medial aspect of the arch of the aorta that was directed superomedially suggestive of a Pseudoaneurysm. The median sternotomy is the preferred incision as in our case when the pseudoaneurysm is found on the

ascending aorta or aortic arch.<sup>14</sup>

The cervical esophagus was mobilized and blunt dissection was carried up to the mediastinum during which an arterial bleed occurred. Gauze packing and median sternotomy were done during which about 500 ml of blood was lost. Median sternotomy revealed a bovine arch, a ruptured pseudoaneurysm of 1.5 cm in the medial aspect of the arch of the aorta noted, and the aorta was repaired under cardiac bypass, following which a cervical esophagostomy was done to mobilize the esophagus and an esophago-cutaneous fistula was made and a separate drain was placed. Finally, a midline laparotomy was done to create a feeding jejunostomy using a 12 Fr feeding tube.

## Conclusion

Impaction of the esophageal foreign body for more than 24 hours can lead to dreadful complications. Thus, endoscopic guided removal of the foreign body esophagus should be done within 24 hours of obstruction. However in cases of delay in removal of the foreign body, complications like aortoesophageal fistula might have developed. Aortic pseudoaneurysm secondary to an esophageal foreign body is a rare and hemorrhage due to rupture of the pseudoaneurysm is a potentially fatal condition. In such cases, strict monitoring and comprehensive multidisciplinary care is warranted to decrease associated morbidity.

## Consent

Written informed consent was obtained ensuring patient's anonymity

## Declaration of competing interest

There are no conflicts of interest.

## Acknowledgement

N/A

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# Chilaiditi sign, an incidental finding in a 3-year-old: A Case Report



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## Abstract

### Background

Chilaiditi sign is an uncommon radiological finding wherein there is presence of bowel between the diaphragm and liver. The patients are usually asymptomatic therefore, the diagnosis is usually incidental. The suggested radiological feature includes presence of gas between liver and diaphragm, which may be often misinterpreted as pneumoperitoneum.

### Case Presentation

We present a case of a young child with the presence of Chilaiditi sign, diagnosed incidentally on performing a plain radiograph.

### Conclusions

Clinicians should be familiar with possible causes of pneumoperitoneum, especially in a young child to decrease the burden of performing unnecessary investigation.

**Keywords:** Case report, Chilaiditi sign, Incidental findings, X-Ray.

## Introduction

Chilaiditi sign is a rare condition with an interposition of the colon between the liver and diaphragm or abdominal wall.<sup>1</sup> In most cases, hepatic flexure of the colon is involved, however, there are few reports of the interposition of loops of the small bowel.<sup>2</sup> The incidence of the Chilaiditi sign has been reported to be between 0.16% and 0.28%.<sup>2</sup> The condition has been more frequently reported in males than females with male: female ratio of 4:1.<sup>2</sup> Here we report a case of a 3-year-old female with dengue fever with an incidental finding of Chilaiditi sign.

## Case report

A 3-year-old female was presented to Dhulikhel Hospital Pediatrics Out-Patient Department with complaints of acute onset fever, cough and noisy breathing for a duration of four days. The cough was acute on onset, dry in nature and associated with post-tussive vomiting. Additionally, there is a history of four episodes of vomiting containing food particles with loss of appetite for 2 days. The patient had no other findings pertinent to gastrointestinal abnormality.

On examination, the abdomen was soft, tender and nondistended. Routine blood investigations were sent,

and the serology test for Dengue NS1 antigen was done, which turned out to be positive. In view of the presenting symptoms, respiratory tract infection was also suspected, thus a normal chest radiograph was sent. On the plain chest radiography (Figure 1), there was presence of gas (as suggested by radiolucent shadow) between the lower border of right hemidiaphragm and superior surface of the liver. Thus, a diagnosis of 'Chilaiditi sign' was made; however the patient was asymptomatic, thus no further investigations were done.

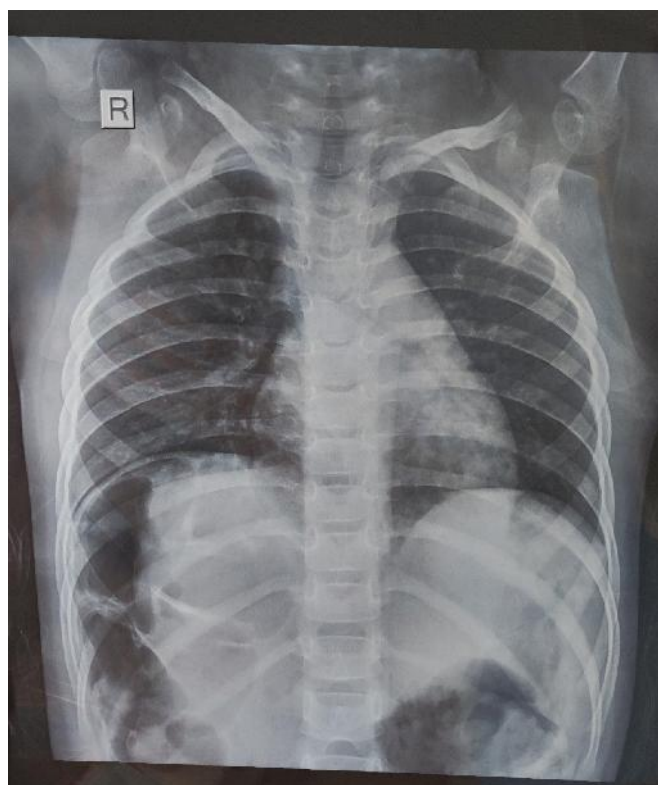


Figure 1. Radiolucent shadow (gas) between the right hemidiaphragm and upper surface of liver indicative of 'Chilaiditi sign.'

## Discussion

Normally due to the presence of falciform of the liver or suspensory ligament of the colon, the interposition of the colon or small bowel loop between the liver and diaphragm is prevented.<sup>1</sup> However, anatomical variations such as elongation, absence, malposition, and laxity of the ligaments can allow pathological malposition of the colon and the small bowel loop.<sup>1</sup> The etiology of these variations can be congenital or acquired due to cirrhosis, aerophagia, diaphragmatic paralysis, chronic lung disease, ascites, obesity, and multiple pregnancies.<sup>1</sup> The colonic or small bowel interposition can be intermittent which can present a challenge in both diagnosis and management of the condition<sup>3</sup>.

The patient can be asymptomatic or in an acute abdomen due to acute intermittent bowel obstruction also known as Chilaiditi syndrome.<sup>4</sup> Chilaiditi syndrome is characterized by symptoms such as pain abdomen,

distention, nausea, vomiting, changes in bowel habits, and more atypical presentations such as substernal pain, cardiac dysrhythmias, dyspnea, and respiratory distress.<sup>5</sup> Chilaiditi syndrome is an exclusion diagnosis, with a 12% incidence on chest radiographs and a 20% incidence on abdomen CT scans in patients with the Chilaiditi sign.<sup>5</sup> The diagnosis of chilaiditi syndrome should begin after ruling out pneumoperitoneum. CT scan is the best imaging modality for its diagnosis and also ruling out diaphragmatic rupture.<sup>4</sup>

Chilaiditi syndrome should be first attempted to be managed conservatively first like bed rest, intravenous fluids, nasogastric decompression, enemas, cathartics, high fiber diet, and stool softeners.<sup>6</sup> If the subsequent follow up shows lack of resolution and ischemia, we should go for surgical management which includes Cecopexy and Colonic resection. Cecopexy is recommended for an uncomplicated cecal volvulus whereas colonic resection is recommended when volvulus involves transverse colon.<sup>1</sup> Colonoscopic Reduction is not done if transverse colon is involved as it has high risk of gangrene.<sup>1</sup>

The complications of chilaiditi syndrome includes volvulus of cecum, splenic flexure or transverse colon, cecal perforation, and subdiaphragmatic appendicitis perforation as it can occur at the time of liver biopsy and colonoscopy if has not been diagnosed before the procedure. It has also been linked with pulmonary and gastrointestinal malignancies.<sup>1</sup>

## Conclusion

Chilaiditi syndrome is a rare condition that is often asymptomatic but can present with acute gastrointestinal symptoms. Due to its rarity, the disease is often misdiagnosed as pneumoperitoneum and over evaluated. Thus, this report is aimed at familiarizing clinicians with the condition to prevent the burden of over evaluation and over treatment.

## Consent

Written informed consent was obtained ensuring patient's anonymity

## Declaration of competing interest

There are no conflicts of interest.

## Acknowledgement

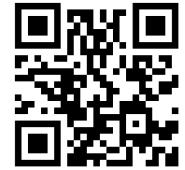
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# Targeted sclerotherapy for venous diseases by contrast washout technique



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## Abstract

Sclerotherapy injection is a minimally invasive technique which utilizes chemical irritants to occlude the abnormal targeted vessels. It is used to treat symptomatic cases of chronic venous diseases like telangiectasia, reticular veins and varicose veins that fail to get better by conservative management. Additionally, some patients opt for sclerotherapy due to cosmetic concerns. Depending upon the extent of the disease, a single or serial episode of injection sclerotherapy is recommended to ensure maximal resolution of the signs and symptoms.

**Keywords:** Contrast radiography, Polidocanol, Sclerotherapy, Telangiectasia, Varicose veins.

## Principle of the procedure

The agents used for performing sclerotherapy are grouped into two classes: detergent (Polidocanol and Sodium tetradecyl sulfate) and osmotic (Glycerin and hypertonic saline).<sup>1</sup> Both these agents ultimately lead to irritation of vein's endothelium causing occlusion of dilated and unwanted veins.<sup>1</sup> In our setup, we prefer using foam formulation of 3% Polidocanol as the sclerosing agent, which works by interference with lipid framework of endothelial cell membrane.<sup>1</sup>

## General Setup

- A detailed history thorough examination of the underlying disease is done in the Vascular Unit of Dhulikhel Hospital.
- Following the examination, ultrasonography (Figure 1) is done to see the extent of the disease, the vessel involved, and flow in the vessel.
  - The superficial veins are grouped as axial (great, small and accessory saphenous vein)

and nonaxial (inter saphenous and lateral marginal veins).

- Venous duplex ultrasound is used to rule out the presence of an axial venous insufficiency, which might be indicative of long standing venous hypertension. This can lead to failure of sclerotherapy. In such patients, venous ablation or phlebectomy should be preferred, with concurrent or interval sclerotherapy.
- The diameter of the non-axial vessel is noted and grouped as:
  - ◆ Telangiectasia (<1 mm diameter)
  - ◆ Reticular veins (1-3 mm)
  - ◆ Varicose veins (> 3 mm)
- Any perforator veins (veins connecting superficial veins with deep veins) are noted.
- Venous malformation (slow flow malformation) is also noted.

- The patient is scheduled for Injection sclerotherapy in the catheterization laboratory.

### Preparation of formulation:

- 2 ml Polidocanol is mixed with 2 ml normal saline and 2ml air using Modified Tessari technique. Depending upon size of lesion, more agents are prepared as required.<sup>2,3</sup>
- Ultrasound guided selection of the cannulation site is done to select superficial, tortuous and straight venous channels.
- The syringe containing sclerosing agent is attached to a 26 G needle (butterfly cannula) (Figure 2).
- A tourniquet is tied higher up to prevent the reflux of the agent to deep venous channels.
- Alcohol is applied to paint the desired area, and the needle is introduced into the targeted vein under guidance of B mode of ultrasound. "Geometry based cannulation technique" is used for cannulation.<sup>4</sup>
- Intraluminal needle placement is confirmed by the loss of resistance, flow of blood into the sidearm of cannula, and curtail fall sign visible on ultrasonography.<sup>5</sup>
- The contrast (10 ml omnipaque +10 ml Normal saline) agent is injected (Figure 4) thereafter to identify the lesion, and note the completion of sclerotherapy. (Figure 3 and 4)
- Sclerosing agent is injected with the same needle. The contrast washout is noted. (Figure 5)
- The needle is withdrawn, and local compression is applied with the help of a cotton ball or gauze piece, which is fixed with a tape before proceeding to proximal veins. This increases the contact time between vein wall and sclerosing agent.
- Sequentially, sclerosing agent is injected from distal to proximal vessels, and the procedure is terminated when all targeted defective veins have been injected with sclerosant.
- Elastocrepe bandages are applied over the treated area. The patients are advised to rest for at least 10 minutes in order to look for excessive pain, bleeding or allergic reaction.
- Tourniquet is removed usually in 3-5 minutes after last injection of sclerosing agent.
- The patient is asked to stay around the hospital area for at least an hour post intervention.
- The patients are advised to wear the elastocrepe bandage for the next 24 hours.

- Next day the bandage is replaced with compression stocking. The same bandage can also be continued. Compression is needed for a minimum of a week.
- The patient is asked to follow up in a week or as soon as possible if any complications develop.
- On follow up, the progress and need of additional sessions of sclerotherapy is determined.

### Anticipated adverse reactions <sup>6</sup>

#### Within 24 hours

- Pain at the injection site.
- Ulceration
- Allergy to contrast or sclerosing agent

#### 24 hours to 1 week

- Hyperpigmentation
- Thrombophlebitis
- Deep vein thrombosis
- Microembolic events

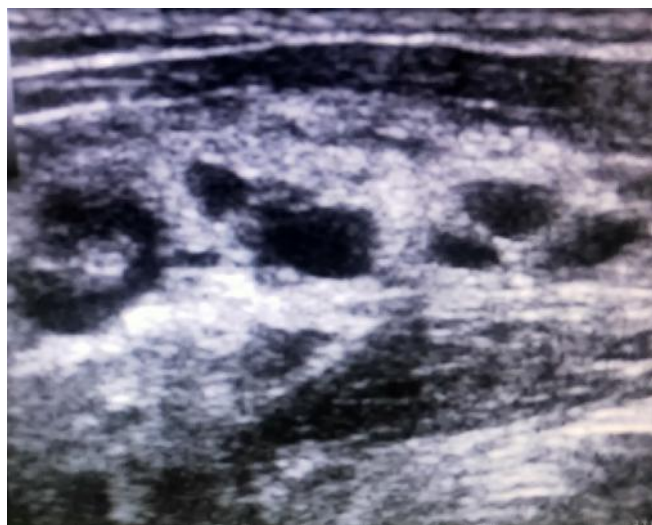
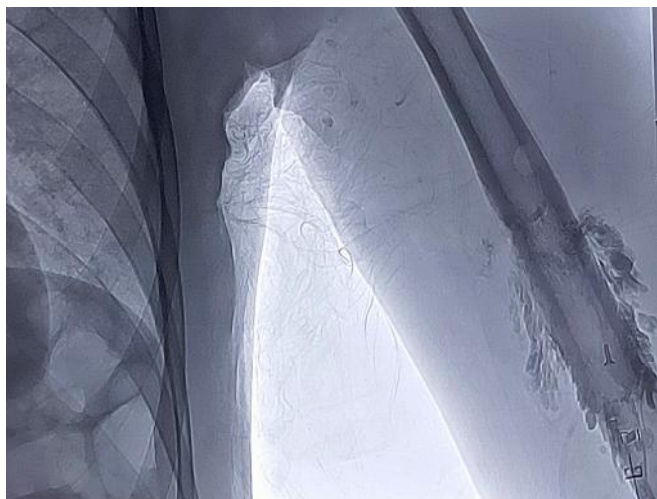


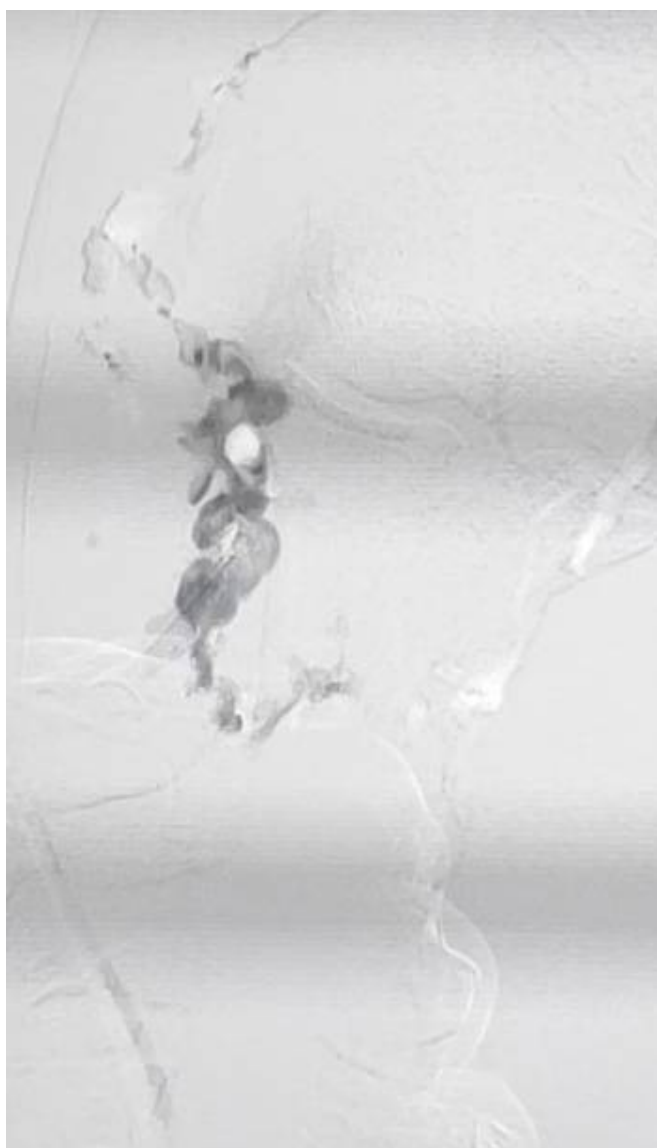
Figure 1. Venous malformation in arm as seen in B mode of ultrasound



Figure 2. Puncture of the lesion and securing the butterfly cannula by one of the vascular surgeons.



**Figure 3.** Mapping out of venous malformation in the upper limb by injecting contrast. During sclerotherapy contrast washout in all the mapped out portions need to be observed to ensure completion.



**Figure 4.** Mapping out of venous malformation in upper arm following contrast injection



**Figure 5.** Complete washout of contrast noted following sclerotherapy injection in lesion shown in figure 4.

### Conclusion

Injection sclerotherapy is a highly effective procedure in treating venous diseases. Most cases of underlying venous disorders have significant resolution of clinical symptoms and signs following serial sclerotherapy injection.

### Acknowledgement

We would like to thank Prof. Dr. Michael Malinowski and Prof. Dr. Dean Klinger from Medical College of Wisconsin and Prof. Dr. Florian Thermann from Carl von Basedow Klinikum, Germany for guidance for starting intervention for venous disease in Dhulikhel Hospital.



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# Factors Affecting Adherence to the use of Compression Therapies in Varicose Veins in a University Hospital of Nepal



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## Abstract

### Background

Varicose vein is a very common venous disease which mostly presents as prominent dilated veins. This disorder can be managed conservatively early on in its course with the help of compression bandaging and regular physiotherapy for stretching and strengthening the calf muscles. Herein, we aim to study the possible factors responsible for lack of adherence in using these compression garments in patients with varicose veins.

### Methods

This study is a cross-sectional study. All the individuals diagnosed as Varicose Veins between January 2020 to March 2020 were recruited for our study. Individuals having concomitant Deep Vein Thrombosis or Lower Extremity Peripheral Arterial Disease were excluded from the study. Prior to the study, detailed information regarding the study was provided and written consent was obtained. All the individuals were sent to the physiotherapy department for appropriate advice on use of compressive stocking and crepe bandages.

### Results

A total of 48 participants diagnosed as varicose veins were recruited for our study. The mean age of the study participants was 43.7 years with standard deviation 13.8 and range between 19-78. Table 1 describes the general parameters of the participants including Age, Sex, Smoking, Occupation, and Educational level. Most of the participants were female (68.8%) and the most common occupation was housewife (27.1%). Most of the participants were educated except 22.9%, who fell under the illiterate category and 60.4% of the participants did not smoke.

### Conclusion

Knowledge deficits and involvement of the great saphenous vein was found to be the major factor responsible for less adherence to compression therapies. Clinicians need greater evidence-based clarity regarding approaches to improve adherence with compression stockings.

**Keywords:** Compliance, Compression therapies, Varicose veins.

## Introduction

Varicose Veins (VV) refer to the prominent and dilated superficial veins in the lower limb affecting 10-20% of the population with an incidence rate of 19%.<sup>1,2,3</sup> Symptoms include pain, itchiness, heavy sensation, leg cramps and pigmentation.<sup>1</sup>

Limb compression is a widely used technique for pre and post-operative management of VV. Stockings and bandages are commonly used for limb compression, the aim being to reduce haematoma, pain and edema.<sup>4,5,6,7</sup> Some of the known factors to decrease adherence for compression therapies are poor fit, inadequate counseling by doctors, cuts off circulation, too hot, needs assistance to wear, etc.<sup>8</sup> Adherence has always been an issue in practice of health care and particularly in the case of VV. Thus, concluding evidence is still lacking to determine the factors that make patients adhere to the use of compression therapies. Hence, the main aim of this study is to explore the factors affecting adherence to compressive therapies in Nepal.

## Methods

This cross sectional study was conducted between November 2020 till September 2021 at Dhulikhel Hospital, a Kathmandu University Hospital. An official permission was taken from Kathmandu University School of Medical Sciences (KUSMS), Institutional Review Committee (IRC), Administrative Department, and from the Department of Surgery and Physiotherapy, KUSMS. Statistical analysis was done using SPSS version 16.0. The nominal variables are expressed in terms of frequency and percentage. Scalar variables are expressed in terms of mean and standard deviation.

All the individuals diagnosed as VV between January 2020 to March 2020 were recruited for our study. Individuals having concomitant Deep Vein Thrombosis or Lower Extremity Peripheral Arterial Disease were excluded from the study. Prior to the study, detailed information regarding the study was provided and written consent was obtained. All the individuals were sent to the physiotherapy department for appropriate advice on use of compressive stocking and crepe bandages. A self administered questionnaire was made by the team which contained detailed information about:

- Demographic information such as age (in years), education (primary/lower secondary/ higher secondary/ bachelors or others), occupation, gender (male/female) and side (right/left/both)
- History of smoking, previous VV surgeries/ sclerotherapy, veins involved
- Clinical characteristics such as pain, itchiness, pigmentation, ulceration

- Compliance related questions for crepe bandaging and compressive stockings

The questionnaire was pre-tested on 10 participants to check for its reliability and necessary corrections were made if any domain needs to be changed or corrected. If the patient was subjected for surgical management of VV, appropriate advice was given during the time of admission. However, in some patients who could not come every month, the questionnaire was filled by doing a telephone interview.

## Results

A total of 48 participants diagnosed as varicose veins were recruited for our study. The mean age of the study participants was 43.7 years with standard deviation 13.8 and range between 19-78. Table 1 describes the general parameters of the participants including Age, Sex, Smoking, Occupation, and Educational level. Most of the participants were female (68.8%) and the most common occupation was housewife (27.1%). Most of the participants were educated except 22.9%, who fell under the illiterate category and 60.4% of the participants did not smoke.

**Table 1:** General parameters of the patients

*Age Mean 43.27, SD: 13.8, Range 19-78*

Parameters	Values	Percentage
<b>Gender</b>		
Male	15	31.3%
Female	33	68.8%
<b>Occupation</b>		
Housewife	13	27.1%
Farmer	8	16.7%
Teacher	7	14.6%
Nurse	5	10.4%
Others	15	31.25%
<b>Educational level</b>		
Bachelors	12	25.0
Higher secondary level	10	20.8
Lower secondary level	9	18.8
Primary level	6	12.5
Illiterate	11	22.9
<b>Smoking</b>		
Yes	19	39.6
No	29	60.4

**Table 2:** Clinical characteristics of the patients

Duration of symptoms	Mean duration 0.8 years	SD 1.08, Minimum 1 month, maximum 4 years.
<b>Side</b>		
Right	20	41.7
Left	12	25.0
Both	16	33.3
<b>Pain</b>		
Yes	38	79.2
No	10	20.8
<b>Itchiness</b>		
Yes	14	29.2
No	34	70.8
<b>Pigmentation</b>		
Yes	9	18.8
No	39	81.2
<b>Ulceration</b>		
Yes	1	2.1
No	47	97.9
<b>Veins involved</b>		
GSV	31	64.6
SSV	12	25.0
Both	5	10.4
<b>History of surgical intervention</b>		
Yes	13	27.1
No	35	72.9
<b>History of sclerotherapy session</b>		
Yes	3	6.3
No	45	93.8
Duration of compression therapy	0.80 years (SD 1.08, 0.1-4)	
<b>Use of compression for recommended period</b>		
Compliant	21	42.9
Not Compliant	28	57.1

**Primary mode of compression**

Stocking	30	61.2
Both	15	30.6
Crepe bandage	4	8.2

**Table 3:** Compliance

	Compliant	Not compliant	P value
Mean age (years)	41.2	44.7	0.41
<b>Smoking</b>			
Yes	8	11	0.85
No	13	16	
<b>Gender</b>			
Male	11	4	<b>0.005</b>
Female	10	23	
<b>Educational level</b>			
Illiterate	0	3	<b>0.04</b>
School level	11	18	
University level	10	6	
<b>Symptoms</b>			
Pain	6	23	0.244
Itchiness	12	5	0.066
Pigmentation	17	5	0.963
Ulceration	1	0	0.252
<b>Veins involved</b>			
GSV	17	14	<b>0.017</b>
SSV	1	11	
Both	3	2	
Duration of Symptoms	0.65 years	0.91years	0.405

Among the participants, the most common symptoms were pain (79.2%) and itchiness (29.2%) as shown in Table 2. GSV was involved in 64.6% of the participants and the average duration of the compression therapy used was 0.8 years (8 months). The primary mode of compression was stocking (61.2%). 13 of the participants



had undergone some surgical intervention and 3 had sclerotherapy sessions. Among the participants only 42.9% were compliant to the use of compression therapy. We found that, male gender and having GSV involvement in varicose veins had significantly more non compliant rates. (Table 3). Logistic regression analysis was done using STATA for the significant factors associated with compliance and discomfort (Tightness, Sweating, Warmth, Itching) was found to be the main factor responsible for less compliance (Table 4).

**Table 4:** Factors determining compliance and non compliance by logistic regression analysis.

Variables	Odds ratio	P value
Gender	0.158	<b>0.005</b>
Educational Level	0.366	<b>0.04</b>
Veins involved	0.598	<b>0.017</b>

**Table 5:** Reasons for non compliance

Reasons for non compliance	Percentage (n=28)
Discomfort (Tightness, Sweating, Warmth, Itching)	22 (78.5%)
Affordability	14 (50%)
Problem during work	9 (32.1%)
Decrease in symptoms	6 (21.4%)
Cosmetic reason (poor appearance)	3 (10.7%)

## Discussion

The results suggest that about half of the participants had less adherence to the use of compression therapies. People who were illiterate, men and who had involved GSV had significant association with compliance. The main factors responsible for less compliance were discomfort, affordability, problems during work, decrease in symptoms and cosmetic reasons. These findings are of clinical importance to health care workers who work for the treatment of varicose veins.

Some of the factors known to affect the compliance were compression discomfort, patient neglect and unfavorable environment.<sup>9</sup> Similar to our study, a study done by Raju et al in 2007, the major factor for non compliance was due to tightness of the stockings. Other factors stated by the literature are physical discomforts

such as tightness, sweating, itching, etc, cosmetic reasons and problems during work. Another reason for non compliance was lack of education given by health professionals during the treatment so in order to avoid this, proper education was given by experienced doctors to all the patients beforehand.

In addition, another study found that only 11.5% of the patients who were prescribed compression stockings, used them regularly.<sup>10</sup> Therefore, the poor adherence to use of stockings and bandaging by patients has led to persistence and recurrence of symptoms.<sup>8</sup> Another study reported that 29.2% of the patients were wearing compression stockings, but only 10.4% did so on a daily basis.<sup>5</sup>

A study has found that there is nine times more risk of recurrence to patients who discontinue compressive therapies as compared with the used one.<sup>11</sup> Given that current treatments for VV have been shown to be more effective only when they are adhered to. Therefore, acknowledging the factors responsible can be utilized in improving the adherence.<sup>12</sup>

There is a lack of literature supporting the reason for lack of knowledge on patient's adherence. In a study done in 2021, 27% of the patients didn't wear compression stockings because of knowledge deficits.<sup>13</sup> Similarly in our study, illiterate people were less compliant than people who were educated.

In practice, the willingness of the patients along with its adherence to correctly use the compressive therapies is significantly important for the effectiveness of the treatment. Poor adherence may reduce the health benefits of interventions thus leading to patient dissatisfaction and poor quality of life.

## Conclusion

Neither unidimensional or multidimensional studies that have attempted to improve adherence have been able to show a definitive preference for any intervention over others. Clinicians need greater evidence-based clarity regarding approaches to improve adherence with compression stockings and therefore further robust research into multidimensional patient centered approaches is needed.

## Limitations

The patients selected in the study were the ones who visited physiotherapy OPD, thus the compliance will be better compared to the ones advised in the OPD. Although both methods were advised, patients were selected even if they opted for only one method and no segregation of the patients was done for this study.

## Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical

standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## Declaration of competing interest

There are no conflicts of interest.

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# Intervention for Peripheral Vascular Disease, Vascular Malformation and Dialysis Access: An experience from Dhulikhel Hospital



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## Abstract

### Background

Peripheral Vascular Disease includes venous diseases and arterial diseases and capillary malformations. Venous disease includes varicose veins occurring either as a distinct entity or as a part of complex venous syndromes. Peripheral Arterial Diseases are common vascular conditions presenting as limb claudication and ischemia of lower extremity. One common vascular malformation involves capillaries of skin presenting as port wine stains. Arteriovenous fistulas are an iatrogenic communication between peripheral arteries and veins made for achieving a high flow access for hemodialysis in patients with End Stage Renal Disease.

### Methods

All cases of intervention done in the catheterization laboratory of Dhulikhel Hospital for peripheral vascular diseases, vascular malformation and dialysis access from December 1st 2020 to November 30th 2022 were included in the study. Details on demographic parameters of the patient, types of peripheral vascular diseases, indication for intervention, type of intervention were noted. The diseases were classified into residual varicose veins, vascular malformation (venous malformation, capillary malformation, arteriovenous malformation, lymphatic malformation, mixed malformation e.g. in Klippel Trenaunay Syndrome), dialysis access failure and peripheral arterial disease. For the procedures requiring fluoroscopy, they were performed in Philips Allura machine, under local anesthesia and taking standard precautions for excess exposure of radiation to operators. For cases requiring ultrasonography, Siemens P300 ultrasound machine with 8-10MHz linear probe was used.

### Results

A total of 637 patients were included in the study in which 57.1% were male and 42.9% were female. The mean age of the patient was 38.2 years. There were 37.2% patients with residual varicose veins, 31.4% with vascular malformation, 8.6% with peripheral arterial disease, 13.2% with chronic kidney disease for dialysis catheter insertion or manipulation and 9.6% with chronic kidney disease for arteriovenous fistula intervention. Of the vascular malformation cases, 54.5% were of venous malformation, 16.5% were of capillary malformation, 16% were of arterio-venous malformation, 11% were of mixed malformation and 2% were of lymphatic malformation.

## Conclusions

Interventions in the catheterization laboratory can address different peripheral vascular diseases, vascular malformation and dialysis access. We feel that performing these procedures in the catheterization laboratory has aided in our ability to do these sometimes-complex procedures as we get excellent resolution of our radiographic pictures.

**Keywords:** *Arteriovenous fistula, Central vein stenosis, Peripheral vascular diseases, Varicose veins, Vascular malformation.*

## Introduction

Peripheral vascular diseases are abnormal conditions of blood vessels that can lead to significant cardiovascular morbidity.<sup>1</sup> These include varicose veins, vascular malformations and peripheral arterial diseases. Depending upon the vessel involved, the patient can present with complaints of claudication, dilation of veins, ulceration and limb swelling. When left untreated, these can lead to life and limb-threatening complications thereby warranting an early management.

Some of the iatrogenic fistulas created for hemodialysis in CKD patients often present with problems of flow, failure in maturation and swelling of arms and neck. In cases requiring urgent hemodialysis, intervention such as catheterization of internal jugular vein with tunneled or non-tunneled catheters are required.

Vascular malformations can occur in veins, arteries, or capillaries. Small capillary malformations are treated with intralesional steroid injections. Venous malformations often require ultrasound guided sclerotherapy. Larger arterial malformations are treated with targeted coiling/embolization of the feeding vessel.

Interventions for peripheral vascular disease and dialysis access were started at the Dhulikhel hospital in December 2021. Despite the high prevalence of these disorders, there is not a lot of literature reporting the use of interventional radiologic techniques for the treatment of these problems. Thus, the main aim of this study is to report the use of interventional radiology to augment the treatment of several vascular diseases.

## Methods

All cases of intervention done in the Catheterization laboratory (cath lab) of Dhulikhel Hospital for peripheral vascular diseases, vascular malformation and dialysis access from December 1<sup>st</sup> 2020 to November 30<sup>th</sup> 2022 were included in the study. Details on demographic parameters of the patient, types of peripheral

vascular diseases, indication for intervention, type of intervention were recorded. All the intervention was done under local anesthesia and patients were monitored for a minimum of an hour in the post procedure bay of the cath lab. Following discharge, if any problems occurred, the patients are asked to contact the cath lab team or visit the emergency department of the hospital. The patients are asked to follow up in a week. If sutures are placed in the intervention site, they are asked to come for a dressing change on the third day post procedure and have sutures taken out at a week. The diseases were classified into residual varicose veins, vascular malformation (venous malformation, capillary malformation, arteriovenous malformation, lymphatic malformation, mixed malformation e.g. in Klippel Trenaunay Syndrome), dialysis access failure and peripheral arterial disease. Additionally, the data on causes of dialysis access failure were classified into stenosis of peripheral vein or thrombosis or central vein stenosis. Details on the different procedures, drugs used, devices and accessories used for intervention of above-mentioned diseases were done as per the "Guidelines on intervention for vascular diseases at Dhulikhel Hospital Catheterization lab 2022".

Procedures requiring fluoroscopy in cath lab were performed in Philips Allura machine, taking standard precautions for excess exposure of radiation to operators. Where ultrasonography was required, Siemens P300 ultrasonography with linear probe of 8-10MHz was used. The use of minimal amounts of radiation and contrast was also ensured. All the procedures were done by one or both of the vascular surgeons in the department with ten and three years of experience along with trained medical officers and nurses of the department. The database was made in Microsoft access 2019 (Microsoft corporation) and analysis was done using Statistical Package for Social Sciences 13 (SPSS Inc., Chicago). The nominal variables were expressed in frequency and percentage. Scalar variables were expressed as mean, standard deviation and range.



## Results

A total of 637 patients were included in the study. The mean age of the patient was 38.2 yrs (SD: 18.2, Range: 6 months to 88 years). There were a total of 364 (57.1%) male patients and 273 (42.9%) female patients. Details on the number of patients in different diagnoses are shown in Table 1. Highest proportion of patients belonged to residual varicose veins followed by vascular malformation. Table 2 shows the number of patients in different vascular malformation types. More than half of such patients were of venous malformation. This was followed by capillary malformation and arterio-venous malformation. There were 22 patients of Klippel-Trenaunay (KT) Syndrome who had mixed vascular malformation. Typical cases of patients with vascular malformations, central vein stenosis, venogram, permanent catheter insertion, angiography and KT Syndromes are shown in Figure 1-6.

**Table 1:** Categorization of patients with Peripheral Vascular Disease and ones requiring dialysis access.

Diagnosis category	Number	Percentage
Residual Varicose veins	237	37.2%
Vascular malformations	200	31.4%
Peripheral arterial disease	55	8.6%
CKD for dialysis access (catheter insertion/manipulation)	84	13.2%
CKD for dialysis access( AV fistula intervention)	61	9.6%

**Table 2:** Different types of Vascular Malformation requiring intervention.

Vascular malformation subclassification	Number	Percentage (N=200)
Venous malformation	109	54.5%
Capillary malformation	33	16.5%
Arterio-venous malformation	32	16%
Lymphatic malformation	4	2%

Mixed malformation (e.g. KT Syndrome)	22	11%
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**Table 3:** Intervention for dialysis access (Catheter insertion/manipulation)

Intervention category	Number	Percentage (N=84)
Tunneled cuffed catheter insertion	53	63.1%
Tunneled cuffed catheter manipulation	25	29.8%
IJ Catheter insertion	6	7.1%

**Table 4:** Intervention for dialysis access (AV fistula)

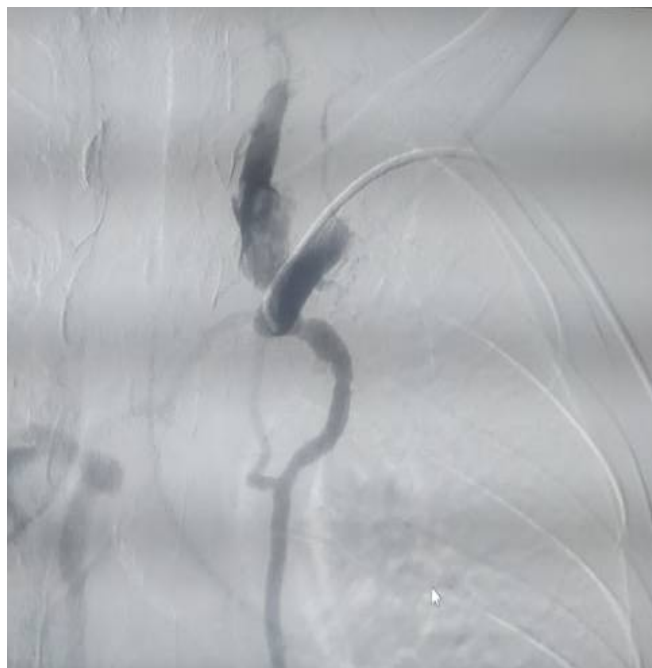
Intervention category	Number	Percentage (N=61)
Stenosis of central vein	56	93.4%
Stenosis of peripheral veins	4	6.5%



**Figure 1:** Central vein stenosis for which angioplasty has been done.



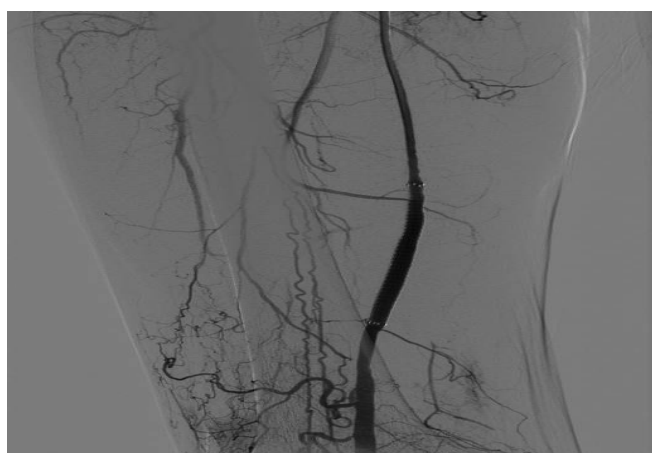
**Figure 2:** Different vascular malformations in which intervention has been done.



**Figure 3:** Image of central vein stenosis



**Figure 4:** Image of tunneled cuffed catheter.



**Figure 5:** Angiography findings of peripheral arterial disease after stenting





**Figure 6:** Typical cases of KT Syndrome for which intervention was done

## Discussion

There are various modalities of treatment for vascular diseases. They can be classified as conservative, medical, minimally invasive, and surgical. Conservative treatment modalities, such as exercises and lifestyle modification, are used for intermittent claudication due to peripheral arterial disease and early stage varicose veins. Similarly, various surgical treatment modalities are available for vascular diseases.<sup>2</sup> At one time open surgical procedures were the mainstay in the treatment of these problems. Less invasive interventional radiologic procedures are now a reasonable, of not preferred alternative means of treatment. Intervention for vascular disease is an evolving field and many advances have been done to treat varieties of vascular diseases. Interventions such as balloon angioplasty, stenting, use of grafts, vascular radiations and coiling are recent endovascular treatment options for various vascular diseases.<sup>3</sup> Intervention for vascular diseases are expected to replace about 50% of conventional vascular surgeries.<sup>3</sup>

Residual varicose veins account for the highest number of cases subjected for intervention. Dhulikhel hospital has treated more than 1600 varicose veins cases via radio frequency ablation with/without adjunct procedures till date.<sup>4</sup> Similarly, the treatment protocol for the management of varicose veins is followed using conservative hemodynamic correction of venous insufficiency (CHIVA) method, in which the sources of the reflux are treated primarily and if there is any significant residual varicose veins, they are addressed as a separate procedure in the Catheterization laboratory.<sup>5</sup> Although frequent visits are required, this is associated with need of sclerotherapy only in necessary patients, thus preventing lesser need of sclerotherapy.<sup>6</sup>

Venous malformation was found in more than 50% of all the malformations in our study. The reason for

this might be because venous malformations are the most common type of malformations accounting for 1-4% of the individuals.<sup>7</sup> In addition, Dhulikhel Hospital is one the few centers in Nepal to address vascular malformation via intervention and a huge number of such cases are referred from all parts of the country including our neighboring country India for management. The hospital is also a referral center for multiple cases of Klippel Trenaunay Syndrome with complex vascular malformation for possible intervention.<sup>8</sup>

Among the dialysis cases, the use of AVF is found to be 25% among hemodialysis patients in Nepal. This data is from the high volume dialysis center in Nepal but as our center is not a primary dialysis center, we mostly receive cases requiring intervention for failed dialysis access. Hence there is a higher proportion of cases of tunneled cuffed catheter insertion/manipulation and intervention for central vein stenosis in our study. In a study done in Nepal by Basnet et al. in 2021, the use of tunneled cuffed catheters was only 2%.<sup>9</sup> Dhulikhel is a referral center for patients that have trouble with their catheters and fistulas.

The presence of AV fistula can lead to severe central vein stenosis compromising adequate blood flow. A study done in 2004 found that of 69 patients who underwent tunneled catheter, 29 patients (42%) had central vein stenosis.<sup>10</sup> Major factors responsible for central vein stenosis and fistula failure was found to be longer time on hemodialysis and a history of previous hemodialysis catheter insertion.<sup>11</sup> Studies have found central vein stenosis more in patients with tunneled cuffed catheter compared to that without history of it.<sup>12</sup>

## Conclusion

Interventions in the catheterization laboratory can help address different peripheral vascular diseases, vascular malformations and dialysis access. The catheterization lab affords excellent radiographic resolution and we feel this helps us make better decisions of how to do the procedure and hopefully this equates to a better result.

## Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## Declaration of competing interest

There are no conflicts of interest.

## Acknowledgement

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- Word limit (1500 words excluding the abstract and references)
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  - Discussion
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  - Methods
  - Results
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## Submission checklist

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