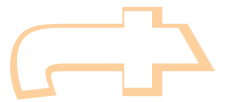




**PROF. MAHMOUD SHAHEEN AL-AHWAL**

*Editor-in-Chief  
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It is with great pleasure that the Editorial Board of the Saudi Journal of Internal Medicine (SJIM) would like to welcome the new board members of the Saudi Society of Internal Medicine headed by Professor Tarik Ahmad Madani. At the same time, we would like to express a great debt of gratitude to the previous board members for their great contribution, inspiring leadership and tremendous support to the society. We believe that the new board will have a huge task to achieve and deliver an honourable mission, including enhancing the standard of scientific developments and professional atmosphere in the field of medicine as to help in create generations of outstanding physicians in the Kingdom of Saudi Arabia. While the task is enormous and the challenges are massive, we believe that the new board with its unique experience and scientific background will be most capable of achieving its goals and meet their highest expectation. We take this opportunity to congratulate them in their new positions and we wish them great success.



# PATHOGENESIS AND MANAGEMENT OPTIONS OF MALIGNANT PLEURAL EFFUSION: A REVIEW ARTICLE

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## ABSTRACT

Malignant pleural effusion is a common complication of many advanced malignancies and is associated with reduced life expectancy. The pathogenesis of malignant effusion depends on the type of cancer. This review briefly discusses the pathogenesis and various management options.

**Keywords:** Malignant pleural effusion, Tunnelled indwelling pleural catheter, Pleurodesis.

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## INTRODUCTION

Pleural effusion complicates many advanced stage intrathoracic and extrathoracic malignancies. The diagnosis of a malignant effusion usually portends as a poor prognosis with an estimated median survival of between 3 and 12 months after diagnosis<sup>[1]</sup>. Currently, the most common metastatic tumour to the pleura is lung cancer in men and breast cancer in women<sup>[1]</sup>. Together, both malignancies account for 50-65% of all malignant effusions<sup>[1]</sup>. Lymphomas, tumours of the genito-urinary tract and gastrointestinal tract account for a further 25%<sup>[1]</sup>. In approximately 5-10% of malignant pleural effusion, no primary tumour site can be identified<sup>[2]</sup>. Mesothelioma accounts for about 3% of cases in old case series<sup>[3]</sup>. However, there are no recent data to reflect the impact of mesothelioma in light of its increasing incidence. The optimal management of malignant pleural effusion continues to provide formidable challenges to chest physicians around the world.

This article briefly discusses the pathogenesis and management options of malignant pleural effusion with a special emphasis on the use of the tunnelled indwelling pleural catheters (TIPC) to provide outpatient management.

### Pathogenesis:

Malignant pleural effusion (MPE) is defined by the discovery of cancer cells in the pleural space. The pathogenesis of MPE is often multifactorial and depends on both the type of malignancy and patient comorbidities<sup>[4]</sup>. In general, the development of MPEs could result from either direct or indirect effects of the underlying malignancies. Metastatic MPEs result from direct extension of malignant cells from an adjacent cancer (such as malignancies of the lung, breast, and chest wall), invasion of the pulmonary vasculature with embolization of tumour cells to the visceral pleura, or hematogenous metastases from distant tumours to the parietal pleura<sup>[5]</sup>. This metastatic spread subsequently results in obstruction of lymphatic stomata along parietal pleural membranes and causes impairment of pleural fluid drainage. Furthermore, pleural tumour deposits also stimulate the release of chemokines that increase vascular and pleural membrane permeability, thereby promoting pleural effusion<sup>[6,7]</sup>. Patients with cancer can also develop pleural effusion even in the absence of cancer cells in the pleural space through the indirect effects of the underlying malignancy. These effusions termed as paramalignant or paraneoplastic effusions. They result from various mechanisms such as bronchial obstruction, mediastinal lymph node metastasis, concurrent superior vena cava syndrome, pulmonary embolism, and the effect of radiochemotherapy.

### Management principles:

Significant morbidity is associated with the development of a MPE. The majority of patients who present with malignant pleural effusion are symptomatic, although up to 25% are asymptomatic with an incidental finding of effusion on physical examination or by chest radiography<sup>[1]</sup>. Dyspnea is the most common presenting symptom<sup>[8]</sup>. Chest pain

occurs due to parietal pleural involvement, ribs or intercostal structure infiltration. Patients may also experience cough, decreased exercise tolerance and weight loss. The development of a malignant effusion can have a profound impact on the overall quality of life experienced by cancer patients in the terminal stages of their illness<sup>[9]</sup>.

The optimal management of MPEs has long been a challenge for physicians caring for patients with end stage cancer. Current management strategies vary widely amongst institutions, and range from surgical procedures requiring hospitalization to treatment on an outpatient basis. Furthermore, management of malignant effusions depend on several factors: symptoms and performance status of the patient, the primary tumour type and its response to systemic therapy, as well as degree of lung re-expansion following pleural fluid evacuation<sup>[1]</sup>. Arguably, the ideal management of MPEs would effectively palliate patient symptoms while minimizing complications, cost, and time in hospital<sup>[4,10]</sup>. In addition, the effective management of malignant effusions is complicated by their extremely high rates of symptomatic recurrence<sup>[11]</sup>. For instance, an early study described the re-accumulation of pleural fluid within 4.2 days of initial drainage<sup>[12]</sup>, while a 30 day recurrence rate of 98% has been reported elsewhere<sup>[13]</sup>. Therefore, the management of an MPE requires both, short-term palliation of symptoms and a means to prevent or control recurrence of the effusion.

### Management Strategies:

Options for management include observation, therapeutic pleural aspiration, and intercostal tube drainage, in addition to instillation of sclerosant, thoracoscopy and pleurodesis or placement of an indwelling pleural catheter<sup>[1]</sup>. Advantages and disadvantages of available management strategies briefly reviewed with special emphasis on the use of tunnelled pleural catheter to provide outpatient management.

### Observation:

Observation is recommended if the patient is asymptomatic and the tumour type is known<sup>[1]</sup>. However, the majority of patients will become symptomatic in due course and interventions will need to be undertaken.

### Therapeutic Pleural Aspiration:

Repeat therapeutic thoracentesis in the past have been advocated as a viable option for frail patients with a very limited life expectancy for the rapid relief of dyspnea and avoidance of hospitalization. However, due to high recurrence rate of MPEs, this strategy is not recommended if life expectancy is more than one month<sup>[1]</sup>.

### Intercostal Tube Drainage and Instillation of Sclerosant:

Chest tube drainage with instillation of a sclerosing agent to induce pleurodesis is also an effective strategy and has long been used in the management of malignant effusions<sup>[1,5]</sup>. In fact, intercostal drainage without pleurodesis is associated with a high rate of effusion recurrence and should be avoided<sup>[1]</sup>. Small bore intercostal catheters (10-14 F) are recommended

to be used for effusion drainage and pleurodesis<sup>[1]</sup>. While the chest tube drains the pleural space allowing pleural apposition, a chemical agent such as talc, doxycycline or bleomycin provokes an inflammatory response within the pleural space ultimately leading to pleurodesis<sup>[14]</sup>. Successful pleurodesis rates of 71% to 96% have been reported for procedures using talc as a sclerosant<sup>[5]</sup>. However, chemical pleurodesis is limited by several disadvantages. This includes the need for hospitalization with a median stay of approximately 7 days<sup>[15]</sup>, thus, often perceived to be a major disadvantage by terminally ill patients. Furthermore, re-accumulation of fluid requiring a second procedure and common procedural side effects such as chest pain are also recognized as disadvantages<sup>[5]</sup>. In addition, a significant subset of patients with an MPE fails to respond to chemical pleurodesis. Poor response is usually attributable to factors preventing adequate apposition of pleural surfaces including a large intrapleural tumour burden, endobronchial obstruction or pleural loculations leading to trapped lung<sup>[5,16,17]</sup>. Dresler et al. found that up to 30% of patients considered for pleurodesis were ultimately deemed poor candidates due to the presence of trapped lung<sup>[17]</sup>.

### Thoracoscopy and Pleurodesis:

Pleurodesis to eliminate the pleural space is a widely accepted and an effective way to manage recurrent effusions. However, the optimal way to achieve pleurodesis has been a matter of some debate, and the literature reflects significant variability in both technique and outcome<sup>[18]</sup>. Insufflation of a sclerosing agent such as talc during medical or surgical thoracoscopy is a common means to achieve pleurodesis and treat MPEs. This modality is effective with short term rates of successful pleurodesis ranging from 71% to 97%<sup>[5]</sup>. Thoracoscopy has added benefits of facilitating lysis of adhesions or loculations when present to enhance lung re-expansion and providing a diagnostic tool when the aetiology of an MPE is uncertain. However, thoracoscopy is a relatively more invasive and a costly procedure. Careful selection of patients with a high performance status (i.e., Eastern Cooperative Oncology Group, ECOG<2) is often required due to the need for increased sedation or even general anaesthesia<sup>[5]</sup>. These patients need to be either fully functioning or at worse, they are ambulatory and capable of self-care and are up-and-about >50% of waking hours. Furthermore, thoracoscopy has less to offer in patients with a known malignant pleural effusion, and a clearly trapped lung on the chest X-ray<sup>[1]</sup>.

Although a number of sclerosing agents are available for use in chemical pleurodesis, sterile talc has been shown to be the most effective in a number of studies, including a recent meta-analysis<sup>[1,19]</sup>. Talc was first used as a sclerosant in 1935 and continues to be widely utilized. However, data on the efficacy of talc are primarily limited to small scale, single center clinical studies. Many of these studies are limited by the use of variable definitions of pleurodesis, short post-procedure follow up, and limited data on long-term symptom control or impact on patient quality of life. In addition, the safety of talc has been questioned. Adverse effects associated with talc instillation in the pleural space range from fever, dyspnea, and

chest pain to the development of acute respiratory failure and ARDS<sup>[5]</sup>. However, the development of ARDS is believed to be related to the systematic absorption of talc particles through the pleural membranes. Thus, talc particle size appears to be a significant factor, with increased complications observed with smaller particle size<sup>[5]</sup>. In fact, the use of large-particle talc for pleurodesis in malignant pleural effusion is safe and not associated with the development of acute respiratory distress syndrome<sup>[20]</sup>. The elegant prospective cohort, open label and multicenter study by Janssen et al.<sup>[20]</sup> confirmed this finding. In this study, 558 patients underwent thoracoscopy and talc poudrage with 4 g of calibrated French large-particle talc in 13 European hospitals, and one in South Africa. The primary end-point was the occurrence of ARDS after talc pleurodesis, which did not occur in any patients. This data supports the safety of large particle talc for pleurodesis. Therefore, graded talc should always be used in preference to ungraded talc as it reduces the risk of arterial hypoxemia complicating talc pleurodesis<sup>[1]</sup>. Presently, only one large randomized prospective trial has addressed both, the efficacy and safety of talc pleurodesis in relation to the appropriate mode of instillation. Dresler et al. compared thoracoscopic talc poudrage and thoracostomy with talc slurry in 482 patients with MPE. Based on the primary end-point of lack of radiographic recurrence at 30 days, the efficacy of the two modalities was found to be similar. However, significant treatment associated morbidity was observed, with respiratory failure in 4% of patients who received talc slurry and 8% who underwent talc poudrage. In addition, a Kaplan-Meier estimator used to evaluate the distribution of recurrence after 30 days demonstrated a roughly 50% rate of MPE recurrence by 4 months post pleurodesis<sup>[17]</sup>. When talc is not available, bleomycin can be used as an alternative sclerosant with a modest efficacy rate<sup>[1]</sup>.

### Placement of an Indwelling Pleural Catheter:

Insertion of tunnelled indwelling pleural catheters (TIPC) to control recurrent and symptomatic malignant pleural effusions is effective. Over the last decade, several studies documented the efficacy and safety of this strategy to provide outpatient management for malignant pleural effusion<sup>[4,9-11,14,21,22]</sup>. They are silicone catheters which are designed for long-term use as they are tunnelled in the subcutaneous tissue to prevent infection and tube displacement<sup>[11]</sup>. They can be inserted at the bedside with local anaesthesia as an outpatient procedure with or without ultrasonographic guidance. Upon catheter insertion, initial fluid drainage is performed under physician observation. Drainage is limited only by patient symptoms such as chest tightness or persistent cough indicating lung re-expansion. Following Post-procedure chest X-ray, patients are able to go home without the need for hospitalization. In order to ensure proper care of the tunnelled pleural catheter and successful home drainage, all patients should be provided with community homecare services<sup>[14]</sup>. Home care nurses ideally should receive special training in the management of the catheter and provide home pleural drainages on a schedule individualized to each patient, typically three times per week. Pleural fluid drainage

can be performed in the patient's home on an intermittent basis with the frequency of drainage determined by the rate of fluid re-accumulation. Catheters are routinely removed when pleural drainage is less than 50 ml on three separate occasions and no change in the chest X-ray is observed<sup>[14]</sup>.

Current guidelines published by the British Thoracic Society<sup>[1]</sup> advocate the use indwelling pleural catheter for controlling recurrent malignant effusions when length of hospitalization is to be kept to a minimum (reduced life expectancy). Moreover, where patients are known or are suspected to have trapped lung, and where expertise and facilities exist for out-patient management of these catheters. The presence of an indwelling catheter also commonly leads to pleurodesis at least in part due to the mechanical irritation and inflammation caused by the catheter itself<sup>[9]</sup>. Spontaneous pleurodesis was reported in 40% to 58% of patients after 2 to 6 weeks in recent studies<sup>[11,21]</sup>.

The advantages associated with the outpatient management of MPEs have been well described. Indwelling pleural catheters are consistently associated with significant symptom control, high rates of spontaneous pleurodesis and low risk of complications<sup>[4,9-11,14,21,22]</sup>. Putnam et al. published a prospective randomized trial comparing an indwelling Pleurx® to doxycycline pleurodesis in 144 patients with malignant pleural effusion. This study demonstrated that the two modalities were equivalent with respect to symptom control, safety and overall efficacy<sup>[15]</sup>. A number of studies have demonstrated that indwelling pleural catheters are effective in the management of MPEs associated with trapped lung<sup>[16]</sup> and in patients with MPE irrespective of their suitability for talc pleurodesis<sup>[10]</sup>. A recent cost-effectiveness study has also demonstrated the comparability of the Pleurx® catheter and talc pleurodesis<sup>[23]</sup>.

Potential catheter related complications and the significant infrastructure requirements are considered the two primary disadvantages of indwelling catheters in the treatment of MPEs. Tremblay and Michaud reported catheter related complications such as empyema (3.2%), pneumothorax (2.4%), cellulitis (1.6%), dislodged catheters (1.2%), bleeding (0.8%) and rare tumour seeding (0.4%)<sup>[21]</sup>. However, overall complication rates are relatively low and compare favourably to other treatment modalities<sup>[9,11,21]</sup>. A more significant limitation to the use of chronic indwelling catheters is the infrastructure needed for the long term care of these patients. An outpatient based MPE program requires sufficient clinic time for both the initial catheter placement and the follow up visits. Frequent scheduled follow-up is necessary both to assess symptom control and to monitor for complications. Ideally, a mechanism should be in place to rapidly address catheter related complications and thus avoid emergency department visits and unnecessary hospitalizations. Considerable community resources are also required to facilitate catheter management and pleural drainages in the patient's home. Infrastructure requirements and resource availability may be factors limiting the utility of outpatient based malignant effusion management in many

institutions<sup>[14]</sup>. Although experience with using the TIPC for MPE is becoming more widespread, there is little existing high-quality evidence comparing the efficacy and safety of the TIPC to other available treatments<sup>[24]</sup>. Prospective randomized studies comparing the TIPC to pleurodesis are needed before the TIPC can be definitively recommended as a first-line treatment of MPE<sup>[24]</sup>.

## CONCLUSION

The presence MPEs in cancer patients represents a significant source of morbidity and causes significant impairment of quality of life. Up to date and despite considerable research, the optimal management strategy remains a matter of some debate. As discussed, the significant safety concerns with intrapleural talc make it less attractive as a palliative therapy except if large particle talc is to be used. In contrast, indwelling catheters are associated with successful palliation of symptoms, high rates of pleurodesis and relatively fewer serious complications. However, the use of TIPC as a first line treatment of MPE cannot be recommended at this time due to lack of high-quality studies. More randomized comparative studies are still needed to solve this debate.

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# PLANTAR FASCIITIS: A REVIEW ARTICLE

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## ABSTRACT

Plantar fasciitis is a common cause of heel pain in adults. It is a clinical diagnosis, as patients classically presents with pain that is particularly severe with the first few steps in the morning. Although it is a self-limited condition; however, due to the severity of the pain, medical attention is sought. Symptoms will ease quicker if risk factors are adjusted and multiple treatment modalities are started as early as possible. This article reviews plantar fasciitis; presents the most effective treatment options currently available.

**Keywords:** Plantar fasciitis

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## INTRODUCTION

Plantar fasciitis (PF) is also referred to as plantar heel pain, heel spur syndrome, or painful heel syndrome<sup>[1]</sup>. It is an enthesopathy (an abnormality or injury at the site of attachment of a ligament or tendon to bone) of the origin of the plantar fascia at the medial tubercle of the calcaneus<sup>[2]</sup>. This leads to inflammation of the thick tissue that creates the arch of the foot. Although commonly described as an inflammatory condition, researchers questioned the actual presence of inflammation in the entire procedure, thus related to the repeated microtrauma, from overstretch or overuse<sup>[3,4]</sup>.

### Epidemiology, incidence and prevalence:

Plantar fasciitis (PF) is one of the most common musculoskeletal (MSK) complain of the foot as it accounts for about 80% of cases of heel pain<sup>[5]</sup>. Researchers observed that 10% of the general population would experience it at least once in their lifetime<sup>[6]</sup>. In the USA, it accounts for over one million visits per year to physicians' office<sup>[7]</sup>. It thought to affects athletics alone, however, also observed in people with sedentary life style as well. It is affected, neither by age nor by gender<sup>[7,8]</sup>.

### Etiology / Risk Factors:

Although the etiology is not clear, however, there are varieties of different data on proposed risk factors<sup>[9]</sup>:

1. Excessive sudden weight load on the foot due to obesity or pregnancy. It have been observed that when the body mass index (BMI) > 25 kg/m<sup>2</sup>, there is 2-fold increased risk for PF<sup>[10]</sup>.
2. Inflammatory arthritis such as rheumatoid arthritis (RA) and spondyloarthropathy
3. Diabetes Mellitus<sup>[11]</sup>
4. Hypothyroidism<sup>[12]</sup>
5. Osteoarthritis<sup>[13]</sup>

### Local causes that lead to repeated microtruma of the plantar fascia suggested as follow:

- a. Mechanical imbalances of the foot problems are due to the foot itself or the use of shoes with poor arch support including flip-flops or soft soles. Foot and arch problems includes; pes planus (flat feet), pes cavus (high arches) and reduced dorsiflexion of the ankle (equinus gastrocnemius). Case-control studies reported the association between these mechanical risk factors increases the risk of plantar heel pain<sup>[14,15]</sup>.
- b. Heel spur (exostosis) studies have been conflicting for the association between PF and heel spur as it was observed in an X-ray of normal population (85% in patients with symptoms of plantar fasciitis vs. 46% of controls)<sup>[16]</sup>.
- c. Long-distance running, especially running downhill or on uneven surfaces<sup>[17]</sup>.
- d. Tight Achilles tendon, which is a common cause, prolongs

flexion of the foot causes shortening of the plantar fascia. Therefore, when the individual stand, it stretches the plantar fascia and accelerates pain<sup>[18]</sup>.

- e. Sudden changes in activities can easily place the tissue in repeated stress over a short period, such as a sudden jump, starting a new running program, or even changing of footwear<sup>[19]</sup>.
- f. Occupations requiring prolonged standing<sup>[20]</sup>.

### Symptoms:

Plantar fasciitis (PF) is clinically diagnosed based on patient's history and physical exam. The most commonly reported symptom of PF is described as 'first-step pain' or 'post-static dyskinesia', which is pain or irritation at the heel rising after a period of non-weight bearing or inactivity. Such as rising from bed in the morning, standing up after working at the desk for several hours, or driving the car for a prolong period.

In severe cases, any activity that stretches the fascia as walking barefoot, climbing stairs, even toe walking will provoke pain. Thus, relieve by rest may radiate from the central part of the heel pad or the medial tubercle of the calcaneum to the medial longitudinal arch of the foot. The key physical finding is local point tenderness along the medial tuberosity of the os calcis<sup>[21,22]</sup>.

The pain could be trigger upon dorsiflexion of the patients pedal phalanges, which further stretches the plantar fascia (windlass mechanism)<sup>[23]</sup>.

The key diagnostic factors for PF are:

1. Presence of risk factors
2. Heel pain
3. Post static dyskinesia
4. Heel pain that is relieved by rest

### Investigation:

Laboratory investigation performs to rule out underlying endocrine and inflammatory conditions. X-rays are required to rule out other causes of heel pain, specifically calcaneal stress fractures and not calcaneal spur, as its rules in the pathogenesis of PF is controversial<sup>[17]</sup>. MRI is perform in patients who are resistant to treatment, to exclude alternative diagnoses that were not observed on the X-ray, such as a calcaneal stress fracture, calcium deposit, or soft-tissue tumor<sup>[22]</sup>.

Ultrasonography is the study imaging of choice due to its low cost when the diagnosis of plantar heel pain is unclear, but it requires a specialized training personal<sup>[23]</sup>.

### Prognosis:

The natural history of PF is often self-limited and resolve in 80% of the patients with-in 1-4 years regardless of the treatment<sup>[9]</sup>. What makes the patients seek medical attention is either the irritation or the incapacitating pain at the time of an attack. For that, trial of conservative therapies is advised before more invasive treatments are attempted<sup>[23]</sup>.



## Treatment

Treatment for plantar fasciitis is divided into numerous categories:

1. Conservative care (patient education, orthotics, soft tissue therapy/massage, ice, heat, strengthening exercise, night splint, chiropractic therapy, electric modalities, acupuncture, and taping)
2. Extra-corporal shock wave therapy
3. Medication
4. Corticosteroids injection
5. Surgical intervention

### Conservative treatment:

There is no consensus as to the proper way to manage plantar fasciitis due to the self-limiting condition. However, it is cost effective to try the low risk conservative interventions first, keeping in mind that patient who continue to have symptoms

despite 2-3 weeks of conservative treatment, referral to a specialist is recommended as CSI may be warranted<sup>[9]</sup>. Acclaimed, all of these modalities are class B, which mean no large RCT conducted to evaluate it effectiveness; it only based on small studies.

**Patient education:** It is a self-limiting condition and the importance of combined multiple treatment regimens at the same time.

**Physiotherapy:** Many modalities are available at the physiotherapy department starting from the application of ice to the stretching exercises. Stretching of the plantar fascia and Achilles tendon considers one of the hallmarks in the management of PF as it relieve the stress on the plantar fascia. An RCT trail conducted on 66 patients showed that in the acute pain setting, Achilles tendon stretch was more effective than plantar stretch. However, at 1 year follow up, both stretching modalities relieved the pain in 90% of the cases<sup>[24]</sup>. The main pain-relieving benefits of stretching appear to occur within the first 2-weeks to 4-months of the symptoms onset<sup>[25,26]</sup>. Cochrane database systematic review stated that there was no evidence regarding the details of the stretching exercise, including number of repetitions or frequency of stretching, or if the stretch was done by a the patient or physiotherapist<sup>[26-28]</sup>.

**Foot Orthotics:** Wide variety of orthotic shoes are available ranging from over the counter prefabricated shoe inserts (e.g., silicone heel pad, felt pad, rubber heel cup) to custom made orthotics. The aim of orthotic therapy is to reduce strain on the plantar fascia by elevating the heel, supporting the medial arch and provide comfort. It is a useful tool for overweight.

Plantar fasciitis (PF) patients, by reducing shock and creating an even weight distribution over the plantar fascia<sup>[29]</sup>. It is an effective method for both, short and long-term relief of pain as demonstrated in one of the longest studies with a follow-up period of 52-weeks. In the same study, the authors observed no differences between over the counter versus

custom made orthotic for pain relief<sup>[21]</sup>. Furthermore, it has been document that combined treatment of stretching exercise and prefabricated foot orthotic was an easy and inexpensive modality to erase the pain<sup>[30]</sup>.

**Splint:** Posterior splint needs to be considered before repeating the CSI. It is worn at night to hold the patient feet at maximum dorsiflexion with toes in an extension position, creating a constant mild stretch of the plantar fascia. This allows the feet to heal at a functional length, preventing contraction and stiffening of the fascia especially in the morning. Limited evidence is found supporting the use of night splint in chronic cases<sup>[25]</sup>.

### Extra-corporal Shock Wave Therapy (ESWT):

Few RCTs evaluated the effect of ESWT on the pain. Rompe et al. included 45 runners who had chronic heel pain for more than 12 months. They observed that 3 times per week treatments of ESWT significantly reduced morning pain in the treatment group at 6 and 12 months when compared with the control group<sup>[31]</sup>. A recent study conducted by the same group showed that plantar fascia stretching program was superior to ESWT for treating acute symptoms<sup>[32]</sup>.

### Medication:

The most common anti-inflammatory agents is cryotherapy (ice) followed by non-steroidal anti-inflammatory drugs (NSAIDs). They are helpful in decreasing both, acute pain and swelling, thus they decrease the pain temporary but not curatively. No studies were found evaluating the effectiveness of NSAIDs alone as it is a multifaceted approach<sup>[33]</sup>.

### Corticosteroid injection (CSI):

Traditionally, CSI injections are administer to those with chronic heel pain after 3 weeks with no improvement on conservative treatment. Hence, keeping in mind that repeated CSI are associated with risk of plantar fascia rupture, fat pad atrophy and transient hyperglycemia in diabetic patients. It is a good method for short-term pain relief. Kim et al. retrospectively examined 120 patients with PF, rupture of the fascia was observed only in (2.4%) of the patients<sup>[34]</sup>. The authors conclude that CSI therapy was safe and an effective form of non-operative treatment of PF associated with minimal complications. This is evidence by a Cochrane database systematic review, based on 19 published controlled clinical trials of fair or good quality, in which pain improvement was noticed at 1 month, but not after 6 months of the procedure<sup>[26]</sup>. Interestingly, a recent systematic review Uden et al., showed that combined orthosis and CSI resulted in an acute pain relief of PF<sup>[35]</sup>. The drawback of CSI, it needs to be performed by a trained physician and the intense post injection pain.

### Surgery:

Surgery is rarely indicated. In a retrospective study done at the Mayo clinic, over a 12-year period, only 16 procedures were performed<sup>[36]</sup>. Thus, reserve for patients who have continuous pain despite 9 months of conservative treatment. The most common procedure is a partial plantar fasciotomy which could be open, percutaneous, or endoscopically.

Closed is preferred from the open method due to the short recovery time. The success rate of surgical release is variable 70–90% and the recovery range from several weeks to few months<sup>[37]</sup>.

### Nutritional Supplementation:

The following additions supplements to the diet have been recommended to ease the pain: Vitamin C, Zinc, Omega-3-Fatty acid and Glucosamine. Thus, keeping in mind that there is no evidence behind it, and if an individual chose to use it, it will be in addition to the conservative therapy under the doctor supervision<sup>[38]</sup>.

## CONCLUSION

Plantar fasciitis is an overuse injury that disturbs the daily activity. It is a clinical diagnosis and a self-limited condition in majority of patients. Limited evidence is available for all the therapeutic options. However, it is successful treatable if more than one modality is used at the same time in the early symptoms.

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# PREVALENCE OF SKIN MANIFESTATIONS IN DIABETES MELLITUS AT KING ABDULAZIZ UNIVERSITY HOSPITAL

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## ABSTRACT

**Background:** The prevalence of diabetes in Saudi Arabia is now one of the highest in the world, with the rise in prevalence of Type II diabetes. Patients with diabetes mellitus commonly suffer from a wide variety of cutaneous disorders.

**Aims:** This study estimates the prevalence of skin manifestations in patients with diabetes mellitus, at King Abdulaziz University Hospital.

**Materials and Methods:** Five hundred and fifty-eight patients with the diagnosis of diabetes, attending the dermatologic and diabetic clinic were included in this study.

**Results:** The common skin disorders were: xerosis (74.7%), pruritus (38.2%), diabetic dermopathy (30.1%), finger pebbles (25.6%), and thickened skin (22.2%).

**Conclusion:** Skin manifestations in diabetics are common. High prevalence of xerosis in our diabetic population is significant and further studies are recommended.

**Keywords:** Diabetes, Skin manifestations.

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## INTRODUCTION

The prevalence of diabetes mellitus (DM) in Saudi Arabia is now one of the highest in the world 23.7%, with the rise in prevalence of Type II diabetes<sup>[1-4]</sup>.

It is estimated that up to 70% of all diabetics suffer from pathologic skin changes during the course of the disease<sup>[5]</sup>. The exact pathogenesis of most of these dermatoses is unknown. It is reasonable to assume that it is linked to the abnormal carbohydrate metabolism, other associated metabolic pathways, microangiopathy, neuropathy, and impairment of the immune system.

There are few epidemiologic data related to skin disorders in diabetics reported from Saudi Arabia and mainly on diabetic feet<sup>[6,7]</sup>. This study was designed to analyze the prevalence of skin manifestations among diabetic patients in Saudi Arabia.

## SUBJECTS AND METHOD

A cross sectional study was conducted at King Abdulaziz University Hospital in Jeddah. The study included five hundred and fifty-eight (558) diabetic patients of either type, during one year, from September 2007. Each patient were interviewed and examined for cutaneous disorders, and all clinically definable cutaneous lesions were recorded in a pre-designed form. Diabetic foot diseases were excluded. Oral consent was taken from all the participants. Statistical analysis of data was performed using SPSS-16 and frequencies of occurrence of various cutaneous manifestations were obtained. Qualitative data were presented in the form of numbers and percentage; chi-square was used as a test of significance. The qualitative data were presented in the form of mean and standard deviation. Significance was considered at *p* value less than 0.05.

## RESULTS

A total of 558 diabetic patients (N 269 48.2% males, and N 289 51.8% females), with a mean age of 52 years (range 20-85 years), of whom 42 (7.5%) had insulin-dependent diabetes mellitus (IDDM) and 516 (92.5%) had non-insulin-dependent diabetes mellitus (NIDDM). The mean disease duration was 11 ± 8.5 years. Of the 558 patients, 536 (96.1%) cases had cutaneous manifestation, while 22 (3.9%) had no skin disorders.

Among the cutaneous disorders found in patients with DM, the most common skin disorder was Xerosis in 417 (74.7%) of patients, followed by pruritus 213 (38.2%). The rest of the skin disorders are shown in Table 1. Xerosis, ichthyosis, dermopathy and finger pebbles were significantly higher in males (*p* = 0.02), whereas pruritus was higher in females.

Diabetic bullae, thickened skin of hands and fingers were significantly higher among Type II diabetics. Whereas, other skin disorders showed non-significant difference between Type I and II diabetes. Xerosis (mean 12.85 ± 8.61 years) and diabetic dermopathy (13.75 ± 7.95 years) were significantly associated with the duration of diabetes (*p* < 0.001).

Among the patients 184 (33%) were Saudis and 374 (67%) were non-Saudis. Skin lesions showed non-significant difference between Saudi and non-Saudi diabetics. Forty-two (7.5%) patients were smokers while the majority 516 (92.5%) patients were not smokers, there was no significant difference between smokers and non-smokers in skin manifestations.

Of notice, none of the patients had granuloma annulare, lichen planus and acquired perforating dermatoses, or glucagonoma.

## DISCUSSION

Cutaneous manifestations of diabetes are common. They usually appear during the course of the disease, but sometimes they may precede the disease. In our patients, the mean age was 52 years and the mean duration of the disease was 11 years. Type II diabetes was the most prevalent among our patients, and this is in agreement with national diabetes studies<sup>[1,2]</sup>.

Xerosis (74%), pruritus (38%), diabetic dermopathy (30%), finger pebbles (25%), thickened skin of hands and fingers (22%), and acanthosis nigricans (12%) were the commonest six skin disorders in diabetic patients. Xerosis was highly associated with duration of diabetes (*p* = 0.001). The reason for the high prevalence of xerosis in our patients is not clear. There was no difference between patients with Type I or II diabetes or males versus females. A similar study from India found xerosis to be the most common among their patients 44%, and they attributed it to the cold and dry weather in their area<sup>[8]</sup>. But the weather in Jeddah is hot and humid all year round, therefore, this cannot explain its prevalence in

**Table 1.** Prevalence of skin manifestations among the studied diabetic cases.

Skin Manifestations	Frequency (%)
Xerosis	417 (74.7)
Pruritus	214 (38.2)
Dermopathy	168 (30.1)
Finger Pebbles	143 (25.6)
Scleroderma- like	124 (22.2)
Skin Tags	104 (18.6)
Acanthosis Nigricans	67 (12)
Ichthyosis	34 (6.1)
Rubiosis Faciei	22 (3.9)
Necrobiosis Lipoidica	19 (3.4)
Vitiligo	17 (3)
Scleroderma Adultorum	16 (2.9)
Granuloma Annulare	0
Lichen Planus	0
Aquired Perforating Dermatosi	0
Glucagonoma	0



our patients.

Sakai et al, found that the clinical presence of dryness are supported by objective findings of a reduced hydration state of the stratum corneum and the decreased sebaceous gland activity in patients with diabetes, without any impairment of the stratum corneum barrier function<sup>[9]</sup>.

Pruritus (38%) was the second most common finding in our patients, compared to the patients from Kuwait 49%<sup>[10]</sup>. Pruritus was not associated with duration of the disease or type of diabetes, but was significantly higher in females ( $p=0.001$ ). Wohlrab et al. stated that about 20–40% of all diabetics report itching symptoms. The etiology of itching cannot be attributed to a single pathophysiologic mechanism. Several cutaneous mediators have suggested that induce pruritus may be linked to metabolic changes in diabetic<sup>[5]</sup>.

Diabetic dermopathy (DD), in the form of minimally scaling, shiny, brownish, atrophic hyperpigmented macules, was the third most common finding in our patients 30%. There was no relation to the type of diabetes, but it increased with the duration of diabetes, and it is more in males ( $p=0.001$ ). Goyal et al. found DD in 36% of their patients<sup>[8]</sup>. It is considered a sign of a diabetic microangiopathy and neuropathy, were hemosiderin is deposited in the skin. Hence, its presence is associated with complications of diabetes. Thus, the presence of DD should prompt aggressive intervention to detect DM and prevent the development of ensuing complications. Unfortunately, no effective treatment for the color is available.

Finger-pebbles was found in 25% of our patients, were the highest finding was 49% patients based in a study from Jammu, India<sup>[11]</sup>. Thickened skin of hands and fingers (scleroderma-like), was present in 22% of cases, 9% had Type I and 23% had Type II, which was statistically significant ( $p=0.0024$ ). There was no difference between males and females. Similar finding of thick, adherent skin on the digits, and occasionally over the dorsum of the hand was found in 24% of 137 children<sup>[12]</sup>.

Acanthosis nigricans occurred in 12% of patients, equally in males and females, and was not related to type or duration of diabetes. It was present in 4.7% in Kuwait<sup>[9]</sup>, and in 2.9% in India<sup>[13]</sup>. Rubeosis faciei, necrobiosis lipoidica diabetorum (NLD), and bullous diabetorum occurred in 3.9%, 3.4% and 2.2%, respectively. There was no relationship to gender or duration or type of diabetes, except NLD was found only in Type II diabetics. Necrobiosis lipoidica diabetorum (NLD) was prevalent in 1.4% of NIDDM patients and 0.0% in IDDM patients<sup>[13]</sup>. Similar finding was present in 1% in Kuwait<sup>[10]</sup>.

Pavlovi et al., found the prevalence of rubeosis faciei in patients with type I diabetes were 7%, and it was found to be weakly related to the disease duration<sup>[14]</sup>. The prevalence in most previous studies in patients with Type II diabetes was estimated at 21–59%<sup>[15]</sup>. It is presumed that venular dilation in the cheeks of diabetic patients underlies rubeosis

faciei and is caused by hyperglycemia-induced sluggish microcirculation<sup>[16]</sup>.

Dermatoses associated with an increased incidence of DM, like granuloma annulare, lichen planus and acquired perforating dermatoses were not detected in the present study, perhaps, due the limited number of patients in this study, and probably, to the low incidence of these dermatosis. Vitiligo was found in 3% of cases. Khurshid et al. found vitiligo in 5.7% of the cases<sup>[13]</sup>.

## CONCLUSION

Skin manifestations in diabetics are common. High prevalence of xerosis in our diabetic population is significant and therefore, further study is recommended.

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# THE INCIDENCE AND CLINICAL OUTCOME OF CARDIAC TAMPONADE FOLLOWING AN OPEN HEART SURGERY IN A DEVELOPING COUNTRY

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## ABSTRACT

**Introduction:** Pericardial effusion is not uncommon following an open heart surgery, thus, it may progress to cardiac tamponade. This is a retrospective cross sectional analysis evaluates the incidence, the potential perioperative and surgical risk factors causing cardiac tamponade following an open-heart surgery of patients during the period 2001-2006 at Ahmed Gasim Cardiac Center in Khartoum, North Sudan.

**Methods:** Diagnosis of cardiac tamponade was based on clinical and echocardiographic findings. Univariate analysis was performed to assess possible risk factors related to both, early and late cardiac tamponade.

**Results:** Among the 890 patients who underwent open heart surgery in this study, 47(5%) patients developed tamponade (early 49% or 51%). Early cardiac tamponade was found to be present with significant cardiac compromise and can easily be detected using echocardiography. In contrast the presentation of late cardiac tamponade, atypical and echocardiography was inconclusive. The mean age of patients was  $31 \pm 12$  with slight female predominance. The main indication for the operation was rheumatic heart disease (89%), mainly mechanical valve replacement of the mitral valve. Eight (17%) patients were receiving warfarin preoperatively. Oozing wounds and blocked drains were encountered in 27% and 37%, respectively. About 6% of the patients recollect tamponade after decompression and one in-hospital death directly related to the cardiac tamponade.

**Conclusion:** Significant cardiac tamponade was associated with preexisting rheumatic heart disease, (preoperative warfarin use), mechanical valve replacement in the mitral position, oozing wounds and blocked drain. Echocardiography was reliable in early diagnosis, but not late, hemodynamically significant cardiac tamponade.

**Keywords:** Tamponade, Open heart surgery complication; Low cardiac output treatment

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## INTRODUCTION

Pericardial effusions are common following open heart surgery (OHS) with an incidence as high as 85%<sup>[1,2]</sup>. Few pericardial effusions; however, progress to become hemodynamically significant and results in cardiac tamponade (CT). The reported incidence ranges between 0.1% - 6%<sup>[1-5]</sup>. There are many factors that can contribute to the development of the condition, including prior anticoagulant and perioperative factors. It can occur early within the first day following cardiac surgery or at a later stage. The diagnosis of the CT can be challenging, especially the late type<sup>[3]</sup>. Cardiac surgery in Sudan is a new frontier and started within the last two decades. This study is carried out as to analyze the population at risk of developing postoperative CT, and in identifying potential perioperative and surgical risk factors leading to this condition. It also examines the risk factors affecting early and late CT as well as to evaluate the impact of CT on patient outcomes.

## MATERIALS AND METHODS

This study conducted a retrospective cross-sectional analysis of consecutive patients who underwent open-heart surgery (OHS) during the period 2001 to 2006 at Ahmed Gasim Cardiac Center in Khartoum, North Sudan, which is the main tertiary referral hospital in the country for cardiac disease. All patients were assessed for the development of CT and followed closely after discharge for 30 days succeeding surgery, primarily at the referred clinic at Ahmed Gasim Cardiac Centre. If a patient required readmission to another hospital, they were sent back to our institution. Medical records for those treated elsewhere were obtained using a predesigned questionnaire. Following surgery, CT occurring in the first day or after the first week is labeled as early or late, respectively. Surgery was classified as either valve surgery, coronary or "other". Other groups included aortic surgery of the root, congenital cardiac defects and cardiac tumors.

Cardiac tamponade were suspected clinically in patient with increasing shortness of breath, hypotension or signs of heart failure or CT. Echocardiograms were performed on 57.4% of the patients who were suspected to have had CT clinically. Those patients who developed CT following OHS (47 patients out of 890 patients) were examined further for the possible contributing factors and causes, including timing and type of OHS, duration of cardiopulmonary bypass, aortic cross-clamp time, intraoperative use of antifibrinolytic agents and number, and site of chest-tubes used. Other pre and post-surgical parameters, such as blood samples for anticoagulation levels, renal function and blood count were also collected. Data was analyzed using simple percentages and univariate analysis was performed to assess the risk factors for the development of early and late CT.

## RESULTS

Among the 890 patients who underwent OHS, only 47 (5%) developed postoperative CT. Approximately 60% of

the surgical procedures were considered elective. The mean duration of cardiopulmonary bypass was  $98.02 \pm 9$  min, with a mean cross-clamp time of  $71.14 \pm 6$  min. Most patients (95%) received intraoperative antifibrinolytic agents as part of the standard operative regimen. Eighty-seven percent of patients with CT had received anticoagulation with warfarin or heparin within the first 3 days following OHS. Chest tubes were removed within 2 days after surgery. Pacing wires were used only in 8.5% of patients, and both mediastinal and chest tube drainage was used in 25.5% of patients.

Table 1 demonstrated that about 49% had "early" CT; while 51% had "late" CT. Of the 47 patients with CT; 35 patients were detected and treated during the initial hospitalization, while 12 patients were readmitted to the hospital for diagnosis and treatment. The age of the patients ranged from 9 months to 65 years with an average of  $31.2 \pm 12$  years. There was slight female predominance (51%). The main underlying disease was Rheumatic heart disease in 89% (Table 1). Eighty-seven percent of patients had an INR of less than 1.3, while only eight patients (17%) received anticoagulation with warfarin prior to surgery (Table 1).

Regarding the type of operation associated with post-operative CT, the mitral valve replacement (MVR) represented the largest group (57.4%), while aortic valve replacement (AVR) and double valve replacement (DVR) were found in 21% and 12.5%, respectively. Other operative procedures include correction of tetralogy of fallot (TOF) and ventricular septal

**Table 1.** Showing the clinical features seen in patients with cardiac tamponade (CHD=congenital heart disease, CT=cardiac tamponade, IHD=ischemic heart disease, INR=international normalized ratio, RHD=rheumatic heart disease).

Age (mean)	31.2 ± 12 yr
<i>Pre existing Heart Disease:</i>	
RHD	42(89.20%)
IHD	2 (4.30%)
CHD	3 (6.40%)
<i>Time of CT</i>	
Less than one day	21 (44.70%)
One day –one week	2 (4.30%)
More than one week	24 (51.10)
<i>Pre operative INR</i>	
Less than 1.3	41(87.20%)
More than 1.3	6 (12.80%)
<i>Symptoms:</i>	
Dyspnoea	37 (78.70%)
Palpitation	29 (38.30%)
Fever	24 (51.10%)
Vomiting	20 (42.6%)

**Table 2.** Demonstrating the type of operation complicated by cardiac tamponade (AVR=aortic valve replacement, DVR=double valve replacement, MVR=mitral valve replacement, TOF=tetralogy of fallot, VSD=ventricular septal defect).

Operation	Frequency	Percent	Cumulative Percent
MVR	27	57.4	57.4
AVR	10	21.2	78.6
DVR	6	12.8	91.4
Correction of TOF	2	4.3	95.7
VSD closure	2	4.3	100
Total	47	100	

**Table 3.** Showing the type of artificial valve used in operations complicated by cardiac tamponade. Prosthesis used

Prosthesis	Frequency	Percent	Cumulative
Mechanical valve	42	89.4	89.4
Tissue valve	1	2.1	91.5
Synthetic mesh	4	8.5	100.0
Total	47	100	

defect (VSD), noticed in 8.6% of patients (Table 2). Eighty-nine percent of the prostheses implanted were mechanical valves and 2% were tissue valves (Table 3).

Regarding treatment outcome, fifty-seven percent of patients with CT underwent surgical drainage of the pericardial effusion by re sternotomy; while 43% underwent subxiphoid incision. The bleeding site was identified in 19 patients (about 40%) and 85% of them developed CT within the first 24 hrs.

After decompression of the heart, majority (94%) of patients improved satisfactorily while a small percentage (3.6%) developed recurrent CT. In this study, one in-hospital cardiovascular death occurred (Table 4).

The volumes of pericardial collections ranged between 0.5-2 liters. Table 5 showed the amount of pericardial fluid drained from patients developed CAMP. The size of the pericardial effusion was mild to moderate (0.5-1 liters) in 61.7% and large (more than 1 liter) in 37.3% of cases (Table 5).

Univariate analysis of the data collected was performed to characterize the features to differentiate between early and late tamponade. It was found that the clinical symptoms of dyspnoea, tachycardia, chest tightness and palpitation were very significantly associated with early tamponade, whereas, the most statistically significant features associated with late tamponade were a prolonged INR and the huge effusion of more than 500 ml. Also noticed that echocardiography was not conclusive in majority of patients with late tamponade (95.8%) though it was useful in the diagnosis of early

**Table 4.** Showing the outcome of the patients who developed cardiac tamponade following open heart surgery.

Outcome	Frequency	Percent	Cumulative Percent
Improved	44	93.6	93.6
Retamponade	3	6.4	100.0
Death*	1	2.1	
Total	47	100	

\*Death occurred in one patient who developed retamponade.

**Table 5.** Demonstrating the amount of pericardial effusion detected in patient who developed cardiac tamponade following cardiac surgery.

Volume (ml)	Frequency	Percent	Cumulative Percent
≤500	12	25.5	25.5
501-1000	17	36.2	61.7
1001-2000	16	34.0	95.7
>2000	2	4.3	100.0
Total	47	100.0	

tamponade (83%). Perioperative factors, such as wound oozing tend to be more associated with early rather than late CT (Table 6).

## DISCUSSION

Although pericardial effusions are common following OHS with an incidence as high as 85%<sup>[1,2]</sup>, only few pericardial effusions progress to become hemodynamically significant and result in CT. The reported incidence of CT ranges between 0.1% -6%<sup>[1,3-5]</sup>. In this study, among 890 patients who underwent OHS over a 5-year period, the incidence was found to be 5.2%, conforming to the findings of other. There was slight female predominance, with tendency of CT to occur earlier in the postoperative period in women. This is consistent with findings other workers in the field<sup>[1]</sup>. Mean time of the diagnosis of CT was 16 days after OHS, which was much higher than what was reported in other studies<sup>[1]</sup>. This is probably because only one patient was presented after more than one year, which cause skewing to the data and increased the average mean value.

Though the incidence of CT has been reported to be higher in the early postoperative period in other studies<sup>[6]</sup>, more than 50% of the cases in our study were found to occur late. “Early” CT is usually related to surgical bleeding or coagulopathy due to the morbid effect of the heart-lung machine. However, late CT seems to be multifactorial in origin; it may present with nonspecific symptoms and may develop without clear-cut clinical signs<sup>[7]</sup>. Also observed that in early tamponade (<7days), effusions were small in size.



**Table 6.** Showing the univariate analysis of the variables associated with early and late cardiac tamponade.

Variable	Early N (%)	Late N (%)	P
Main Diagnosis (Rheumatic/non rheumatic)	6 (26%)	0	.009
Duration of Disease	16 (70%)	23 (96%)	.02
Duration of symptoms of tamponade	2 (9%)	24 (100%)	.000
Dyspnoea	10 (44%)	0	.000
Tachypnoea	10 (44%)	0	.000
Chest Tightness	15 (65%)	0	.000
Palpitation	18 (78%)	0	.000
Fever	20 (87%)	1 (4.2%)	.000
Vomiting	23 (100%)	4 (16%)	.000
Chest X-ray	9 (39%)	0	.001
Echocardiography	19 (83%)	1 (4.2%)	.000
INR	0	11 (46%)	.000
Volume on Drainage	11 (48%)	24 (100%)	.000
Drain Site Medistinal/medist+pleur.	9 (39%)	3 (13%)	.038
Oozing surgical wound	10 (44%)	0	.000
Blocked Tubes	7 (30%)	0	.000
Effusion Localized/Diffuse	15 (65%)	24 (100%)	.002
Prosthesis Mechanical/Non-mechanical	5(22%)	0	.022

INR = international normalized ratio

Additionally patients with this condition presented with clear clinical features of cardiac compromise compared to those seen with late tamponade, where the clinical presentation was atypical. This emphasizes the importance of high index of clinical suspicion in the latter group and the importance of long term follow up. Similarly, echocardiography was found to be more help in the diagnosis of early, rather than late CT. In fact, echocardiography was performed in 57.4% of patients to confirm the diagnosis of CT. In seven patients offered echocardiography, the reports were negative, but clinical and operative findings were diagnostic. Echocardiography is useful for the detection of pericardial effusions following OHS and allows for rapid, safe and accurate localization of the effusion and estimation of its size<sup>[8]</sup>. It should be noted that the size of postoperative pericardial effusion does not necessarily reflect the likelihood of developing CT. In 7 cases of our study, despite the exclusion of CT by echocardiography, still CT remained clinically detectable and this was confirmed intraoperatively'. Although the pericardium may be left open following surgery, acute accumulation of only a moderate amount of blood can readily cause cardiac tamponade in a patient

postoperatively<sup>[9]</sup>. Small amounts of effusion aggravated by compression imposed by two or more drain tubes may lead to the development of clinically significant CT, which needs further confirmation. Right ventricular diastolic collapse is a useful echocardiographic sign of tamponade in the presence of circumferential effusion<sup>[10]</sup>. However, when the effusion is loculated or in the presence of elevated right-sided pressures, this sign may be absent.

Previous studies have related "late" postoperative CT to various surgical factors including excessive postoperative mediastinal drainage and postpericardiotomy syndrome<sup>[11,12]</sup>. Interestingly, 12 of the patients in this study had been previously discharged from the hospital following surgery and required readmission.

The development of pericardial effusions following cardiac surgery appears to be directly related to coagulation abnormalities. Use of preoperative antiplatelet agents such as aspirin, anticoagulation with warfarin or heparin, can cause increased bleeding at surgery and may all contribute to postoperative pericardial effusions<sup>[13]</sup>. In this study, nearly

more than one third of the patients were taking aspirin and were receiving heparin or warfarin therapy prior to surgery. Most patients received aspirin within the first 24 hrs after surgery, while heparin or warfarin was usually given within 3 days after surgery. Anticoagulant therapy has therefore been considered a major contributing factor in the development of intrapericardial bleeding and CT. The INR in our series is found to be elevated but still within the therapeutic levels and is significantly associated with late CT.

The adverse effects of cardiopulmonary bypass (CPB) on coagulation parameters are well known and likely have a role in the pathogenesis of postoperative pericardial effusions<sup>[8]</sup>. In this study, patients had a mean duration CPB of  $98.02 \pm 9$  min and the mean cross-clamp time was  $71.14 \pm 6$  min. An increased time of those two parameters is more likely to be associated with increased risk of bleeding, and probability of developing pericardial effusions and CT following surgery.

Because CT can potentially be fatal, early decompression is required as soon as it is confirmed. CT occurring within 24 hrs is almost always treated surgically, since it is essential to identify the source of bleeding. 'Late' CT has been traditionally drained surgically by a subxiphoid incision or a full re-sternotomy. However, CT has been successfully treated by percutaneous pericardiocentesis under echocardiographic and fluoroscopic guidance, which may allow for shorter hospital stay and decreased morbidity. This technique has proved to be effective in the treatment of anterior and circumferential effusions, but surgery is usually required for loculated posterior effusions<sup>[8]</sup>. One in-hospital death occurred in our study related to CT after developing recurrent CT. All other patients were discharged either home or to rehabilitation.

There are several limitations to this study. It is a retrospective analysis of patients who developed CT after OHS and the findings are not compared with a control group other than those in similar reports in the literature. In addition, not all patients underwent an echocardiogram after OHS; therefore, the incidence of pericardial effusions or CT after OHS may be underestimated. While our nursing staff follows all postoperative patients closely after hospital discharge, it is possible that some cases of CT were missed and were not used for this analysis. In addition, each patient examined in this study underwent full cardiopulmonary bypass. Furthermore, this study was conducted before newer antiplatelet agents were started to be commonly used. Thus, with the recent advances in cardiology and OHS, it is unclear how these findings will reflect the real picture of this complication in the present-day cardiac surgery. Nevertheless, cardiac surgery is new in Sudan and hence, these findings are important to be presented, so subsequent improvement can be compared with.

## CONCLUSION

In conclusion, this study indicated that CT following OHS is a serious and potentially fatal condition that can be clinically challenging from diagnostic and therapeutic perspectives. However, when diagnosed and treated promptly, postoperative

CT should not significantly increase mortality. This study found that CT after OHS was more common following valve surgery. Pre and postoperative use of anticoagulants is related to the development of CT. In addition, women appear to have a slightly higher risk for developing postoperative CT than men, which is not statistically significant.

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# KNOWLEDGE OF PULMONARY TUBERCULOSIS IN THE SAUDI COMMUNITY IN JEDDAH

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## ABSTRACT

**Background:** Pulmonary tuberculosis is a common and current health problem in Saudi Arabia. Public education and awareness are essential for the prevention of tuberculosis. This study aims at assessing the level of knowledge among people in Jeddah regarding this re-emerging disease.

**Methods:** A cross-sectional, self-administrated questionnaire-based study was conducted at three main shopping centers in Jeddah city, after pilot study testing. A structured questionnaire was developed to assess the basic knowledge about pulmonary tuberculosis which included demographic data, level of education, source and level of knowledge (basic facts) about pulmonary tuberculosis.

**Results:** The questionnaire was completed by 436 recruited subjects; 256 (58.7%) females, age ranged between 12 and 72 (mean 28.54 years; SD  $\pm$  11.2); 165 (38.9%) were students and 154 (36.3%) were employees. The majority (73%) of candidates were relatively well educated or completed high school. 53.3% of the candidates assumed had sufficient knowledge regarding tuberculosis. 36% were unaware that lungs were the primary organ affected, over half (50.9%) denied it is an infectious disease, and almost half (47.4%) were unaware of effective treatment. The mean score of the level of knowledge for the whole group was 5.20 out of 11 (SD  $\pm$  2.95); 39% scored less than 4. Females scored better than males, 5.55 and 4.69 out of 11, respectively with a *p* value of 0.003.

**Conclusion:** The data showed that public awareness regarding pulmonary tuberculosis was below expectation. Essential information about the disease was lacking even among well educated people, though female were found to be knowledgeable compared to males.

**Keywords:** Pulmonary tuberculosis; Public knowledge; Community; Jeddah.

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## BACKGROUND

Tuberculosis (TB) is one of the main causes of morbidity and mortality worldwide. The World Health Organization (WHO) stated that one third of the world has been exposed to the TB pathogen<sup>[1]</sup>. Pulmonary tuberculosis is a common and current health problem in Saudi Arabia<sup>[2,3]</sup>. Although there is an increase in knowledge and infection control measures around the world, there are high numbers of cases in many parts of the world. The WHO reports incidence 9,471 (40/100,000), prevalence of 13,267 (55/100,000) and mortality rate of 1,099 (5/100,000) cases caused by tuberculosis in Saudi Arabia in the year 2004 alone<sup>[2]</sup>. Western region is considered as a highly endemic area; due to the rate of TB infection in Jeddah are about 64 cases per 100,000, while in Riyadh the rate is about 32 per 100,000. The higher rate in Jeddah may be related to the high number of pilgrims per year<sup>[4]</sup>. Many known factors make people susceptible to TB infection. Human Immunodeficiency Virus (HIV) infection is one of the main factors as many of TB patient are HIV positive<sup>[5]</sup>. Diabetes is an important factor as well<sup>[6]</sup>. A study done by Davies et al. revealed that smoking more than 20 cigarettes per day increases the susceptibility to get infected by four folds<sup>[7]</sup>. Other illnesses that have been attributed to TB infection are chronic lung disease, end-stage renal disease, Hodgkin lymphoma, malnutrition and alcohol consumption<sup>[8]</sup>. Tuberculosis is considered as a social disease, which explains the importance of the social factors in TB transmission. Social factors involve illiteracy, low socioeconomic status, poverty, poor housing, overcrowding and large size families<sup>[9]</sup>. Knowledge about TB has shown to increase compliance to treatment among TB patients and an increase cure rate<sup>[10]</sup>. In addition, more knowledge and awareness may improve the control measures that will lead to the decrease of the transmission of the disease<sup>[11]</sup>. Although public education and awareness is essential for the prevention and lowering the spread of tuberculosis, many studies revealed that there are limited information and many misconceptions about this infectious disease<sup>[12,13]</sup>. Therefore, intensive educational program may interfere with spread of this preventable disease. The main aim of this study is to assess the level of public general knowledge regarding pulmonary tuberculosis in the city of Jeddah.

## METHODOLOGY

After obtaining ethical approval from the committee of ethics at King Abdulaziz University, pilot study was carried out on 30 persons in order to examine the face validity, and to ensure accuracy and simplicity. However, some questions were modified. The results of this pilot study were not included in the results.

A cross-sectional questionnaire-based study was conducted through an educational campaign during the period of March 1st to April 1st 2010 at three main shopping centers in Jeddah city whereby a convenient sample was taken. Target population was Saudi general public at shopping centers. Exclusion

criteria were non-Saudi and people less than 12 years old. A structured self-administrated questionnaire was developed to assess the basic knowledge about pulmonary tuberculosis after obtaining participant permission. This questionnaire was translated into Arabic and took approximately 10 minutes to complete. Questionnaires were completed during face-to-face interviews conducted by volunteer medical students and informed consent was obtained from each study participant. The questionnaire consisted of three sections: Section one included demographic data, working status, level of education, income and source of knowledge. Section two aimed to test people's knowledge through eleven basic questions about the disease including primary organ affected, causative agent, mode of transmission, common symptoms (fever, weight loss, cough and hemoptysis, fatigue, dyspnea and anorexia), factors that activate the disease, and availability of treatment. Section three inquired about sources of knowledge, whether participants believe they have sufficient information or if more information about the disease is needed. By using Guttman's split-half coefficient test, the reliability of questions regarding knowledge about TB was 0.60.

Lastly, a scoring system was designed to assess the level of participants' knowledge. This scoring system is based on participants' responses to the 11 inquires in section 2 of the questionnaire mentioned above. The levels of knowledge were divided into low (score ranging from 0-4), intermediate (5-8) and high (score of 9-11). All data were verified, coded and analyzed using the Statistical Package for the Social Sciences (SPSS) software package, version 16. Data were presented as mean and standard deviation for quantitative variables. Chi-square test was used to compare knowledge and different variables; "student's" t-test was used to compare the mean age and mean knowledge score between genders.

## RESULTS

Total number of participants was 436. Of them 256 (58.7%) were females with the mean age of 28.54 year (SD  $\pm$  11.2) ranged between 12 and 72. The mean ages between male and female was relatively the same, 28.71 (SD  $\pm$  11.56) and 28.42 (SD  $\pm$  10.49), respectively. Gender, mean age, occupation and level of education between genders are shown in Table 1. The majority of the subjects were relatively well educated, since 193 (45.8%) are university graduates and 135 (32.1%) only completed their high school education. Regarding participant's monthly income; most of them had less than USD1,500, and from USD1,500 to USD4,500 as monthly income, 165 (46.7%) and 140 (39.7%), respectively.

From the total population, 225 (53.3%) thought that they had enough information about TB. The most common sources of their information were the media, public education and schools; 119 (27.3%), 107 (24%) and 103 (23.6%), respectively.

More than two-thirds, 292 (68.1%), knew that the lungs are the primary affected organ by TB, whereas the remaining

**Table 1.** Demonstration of study population (n=436) regarding age, occupation and education between gender.

Characteristics	Male N (%)	Female N (%)	Total
Gender	180 (41.28%)	256 (58.71%)	436
Mean Age (± SD*)	28.71 (±11.564)	28.42 (± 10.939)	28.54 (± 11.2)
<i>Occupation</i>			
Employee	104 (24.5%)	50 (11.8%)	154 (36.3%)
Students	61 (14.4%)	104 (24.5%)	165 (38.9%)
Housewives	0 (0%)	72 (17%)	72 (17%)
Without a job (unemployed)	9 (2.1%)	24 (5.7%)	33 (7.8%)
<i>Level of Education</i>			
Intermediate	12 (2.9%)	28 (6.7%)	40 (9.5%)
High School	52 (12.4%)	83 (19.7%)	135 (32.1%)
University	78 (18.5%)	115 (27.3%)	193 (45.8%)
Diploma	18 (4.3%)	15 (3.6%)	33 (7.8%)
Higher Education	12 (2.9%)	8 (1.9%)	20 (4.8%)

\* SD=Standard Deviation

**Table 2.** Correct answers of participants (n=436) to simplified form of questions on knowledge of tuberculosis (TB) and differences between genders.

Statement	Male N (%)	Female N (%)	P-Value
1. Lungs are the primary organ affected	103 (58.9%)	189 (74.4%)	0.015
2. The cause of TB is bacterial in origin (Mycobacterium )	84 (48.6%)	126 (49.4%)	0.209
3. Main mode of transmission is airborne	94 (57%)	177 (71.7%)	0.005
4. TB may be activated by immunodeficiency	50 (30.9%)	88 (37.1%)	0.35
5. Availability of effective treatment	80 (51%)	124 (53%)	0.46
<i>Appropriate symptoms of Tuberculosis include:</i>			
6. Fever	72 (40%)	113 (44.1%)	0.39
7. Weight loss	60 (33.3%)	112 (43.8%)	0.028
8. Productive cough & Hemoptysis	107 (59.4%)	186 (72.7%)	0.004
9. Dyspnea	67 (37.2%)	105 (41%)	0.43
10. Loss of appetite	61 (33.9%)	91 (35.5%)	0.72
11. Fatigue	66 (36.7%)	111 (43.4%)	0.16

study population's answers were as follows; liver 20 (4.7%), skin 23 (5.4%), reproductive system 13 (3%), or do not know 74 (17.2%). Regarding the cause of the disease, 210 (49.1%) of participant knew that the cause of tuberculosis was bacterial but about half, 218 (51%), denied that it is an infectious disease to start with. Two-thirds, 271 (65.8%), of participant reported correctly that airborne is the mode of transmission while the remaining third thought that TB is transmitted sexually, via cutaneous contact, hereditary

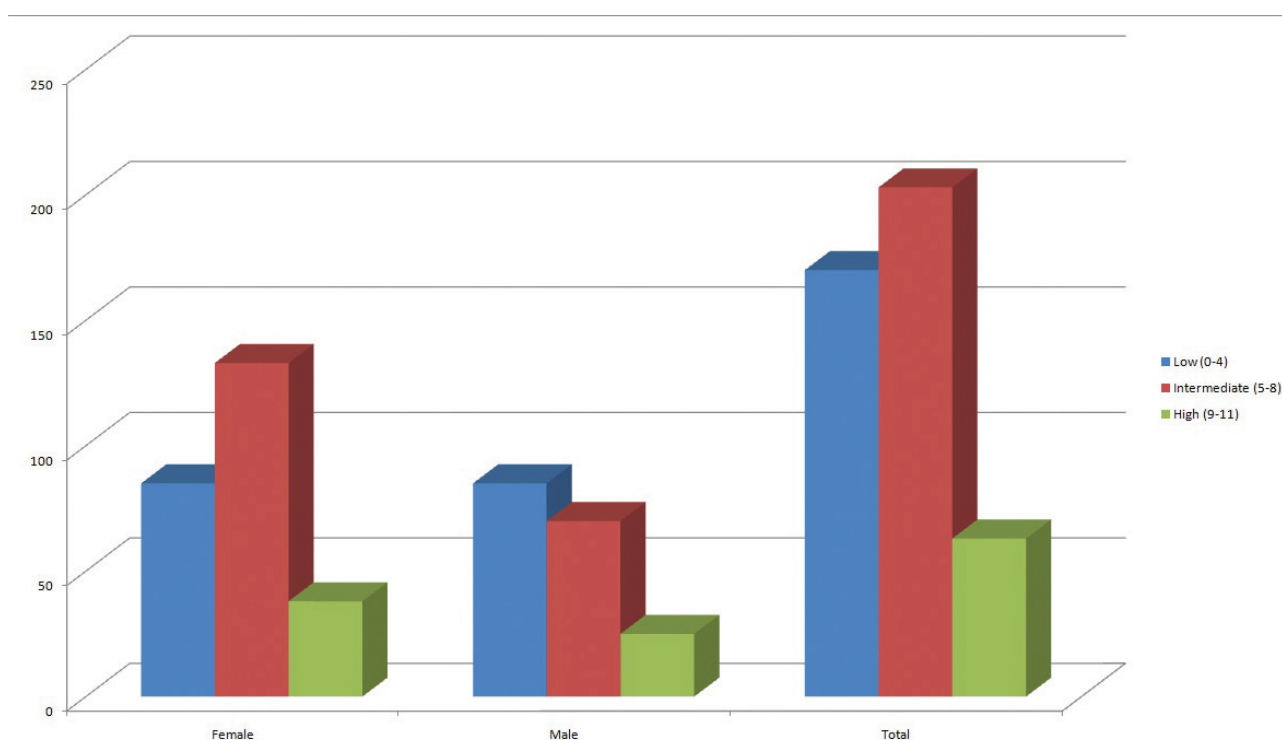
disease, or do not know.

Subjects' responses regarding clinical presentation of TB are shown in Table 2. However, 145 (31.5%) of study population admitted that TB is reactivated due to immune suppression. Almost half of the participant, 287(47.7%), were not aware that there is an effective treatment for TB. Their answers were either no effective therapy, only symptomatic treatment, or do not know. All subjects' correct answers of the 11 questions are demonstrated in Table 2.



**Table 3.** Levels of knowledge of the study population (Scale ranges from 0 - 11). Showing that females' score was better than male with significant p value (0.003).

Level of Knowledge	Total	Male	Female	P-Value
Low (0 – 4)	170 (39.0%)	85 (47.2%)*	85 (33.2%)	0.01
Intermediate (5 - 8)	203 (46.6%)	70 (38.9%)	133 (52%)	0.01
High (9 – 11)	63 (14.4%)	25 (13.9%)	38(14.8%)	0.01
Mean Score	5.20 (SD ± 2.958)	4.69 (SD ± 3.086)	5.55 (SD ± 2.817)	0.003



**Figure 1.** Level of knowledge shown in graph.

Although there was no statistically significant difference between genders in income or educational level, females' level of knowledge was better than males as shown in Table 3 and Figure 1. Hence, when using the scoring system for level of TB knowledge, the mean score for the study population was 5.20 out of 11 (Table 3). Again the mean score for the female participants was significantly higher than the male (5.55 (SD ± 2.817), 4.69 (SD ± 3.086), respectively, p value: 0.003). However, 170 (39%) scored less than 4 and only 63(14.4%) scored higher than 9. Figure 1 demonstrates subjects' level of knowledge score in bar graph.

### DISCUSSION

This study showed that only half (53.3%) of the study population believed they have some degree of fair knowledge about tuberculosis. Using scoring system, the level of knowledge for the whole group was only 5.15 out of 11 (SD ± 2.95). Although the overall score for the whole group may appear sufficient, 39.5% scored less than 4 out of 11, 36% did not know that lungs were the primary affected organ, about

half (50.9%) denied that it is an infectious disease, and more than 47.4% were not aware of an effective anti-tuberculosis treatment. These disappointing findings were despite the fact that majority are considered educated, since 193 (45.8%) are university graduates and 135 (32.1%) completed their high school education, which would indicate the need for general awareness campaign about this disease. Interestingly, our study showed females that had more knowledge about tuberculosis compared to males. This contrasts with similar studies performed in other countries such as China<sup>[14]</sup> and Sudan<sup>[15]</sup> for which showed that males had better knowledge regarding tuberculosis than females<sup>[16]</sup>. Hence, the discrepancy between our study and these studies could not be explained, but could be related to different methodology or different educational level of the study population. In fact, most of the studies in the literature about knowledge and perception were done among TB patients and health seeking people. As most of our candidates are well educated, the increased knowledge about the disease among females may be just a reflection of the fact that females are usually more

keen and studious than males.

In our study, the majority (68.1%) of candidates knew correctly that the lungs are the main organ involved in TB infection, which is close to that of a Nepalese's study where (58%) of study population knew that correctly<sup>[16]</sup>. In addition, nearly half (49.1%) of the candidate knew that TB is caused by a bacteria and 65.8% knew that it is an infectious disease transmitted by droplets which is actually higher than that reported from Nepalese and Sudan (50% and 40.4%, respectively)<sup>[15,16]</sup>. Few patients knew other ways of transmissions. It is interesting to know that only 34.6% of the participant knew that there is a relationship between TB and the immunodeficiency. In Nepalese population, only 16.6% of the study candidates were aware that TB is a common opportunistic infection among HIV patients<sup>[15]</sup>. Comparing to Chinese people (73.6%), only 52% of our study population knew that TB is a curable disease.

In our study, many of the candidates were aware of TB symptoms such as coughing with bloody sputum (67.2%), fever (42.4%) and weight loss (39.4%). Such awareness of TB clinical presentation may help in controlling the spread of this highly infectious and epidemic disease by proper suspicion, and hence, early medical consultation. Sociological studies in India have shown that most pulmonary TB patients have one or more chest symptoms and the majority seeks early medical advice on their own<sup>[15]</sup>. This difference in awareness between Saudi Arabia and other parts of the world could be related to different sampling methods, different level of literacy or the presence of health awareness campaigns. The best way to gain knowledge about medical disease, according to participant in our study, is through public education (71%), by emphasizing the important role of health administration, and by the media in increasing the health awareness by public health campaign. Despite the positive results this study has revealed, it has several limitations. Although the sample size of this study was convenient, however, better sample randomization may further eliminate bias speculation. Furthermore, the sample was taken from three shopping centers in one city in Saudi Arabia and therefore, not a fair representative of the Jeddah or the whole country. In addition a self-developed invalidated questionnaire was used which may affect the accuracy of the collected data. Using a validated questionnaire would give more robust results in the future. Further study is recommended to develop a general guideline for developing awareness campaign and health education for TB patients.

In conclusion, our data showed that public awareness regarding pulmonary tuberculosis was under expectation. Essential information was lacking even among well educated people. Therefore, more efforts to address this problem are crucial in order to help in preventing this most fatal infectious disease worldwide. This is probably by designing frequent health educational campaign to increase community general awareness about the disease, which is crucial to the control of the infection.

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# HEMORRHAGIC CEREBRAL VENOUS INFARCTION IN A PATIENT WITH ATRIAL FIBRILLATION: CASE REPORT OF AN UNUSUAL MRI FINDING

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## ABSTRACT

Venous sinus thrombosis is an uncommon cause of stroke. Magnetic resonance imaging and magnetic resonance venography are sensitive and specific non-invasive tools for the diagnosis. This is a report of patient who presented with atrial fibrillation and heart failure. The course of the disease was complicated by left-sided transverse sinus thrombosis leading to hemorrhagic stroke. There was normal looking transverse sinus upon contrast injection with gadolinium despite the lack of flow on magnetic resonance venography. It is postulate that this apparently normal transverse sinus appearance on post gadolinium T1-weighted imaging was a result of thrombus enhancement in the acute stage of the venous occlusion. This finding could mislead the diagnosis if it was read in isolation without the confirmation of the occlusion in magnetic resonance venography.

**Keywords:** Venous sinus thrombosis, MRI, MRV, Enhanced thrombus, AF, Enhancement.

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## INTRODUCTION

Cerebral venous sinus thrombosis (CVSS) is a challenging condition due to its variability in clinical presentations, and the need of high index of suspicion to reach and confirm the diagnosis<sup>[1,2]</sup>. It can be complicated with hemorrhagic infarction and subsequently increases mortality rate<sup>[2,3]</sup>. Early and accurate diagnosis is required to prevent complications and decrease this mortality<sup>[4,5]</sup>. Magnetic resonance imaging (MRI) and magnetic resonance venography (MRV) are useful tools for the diagnosis<sup>[6,7]</sup>.

## CASE REPORT

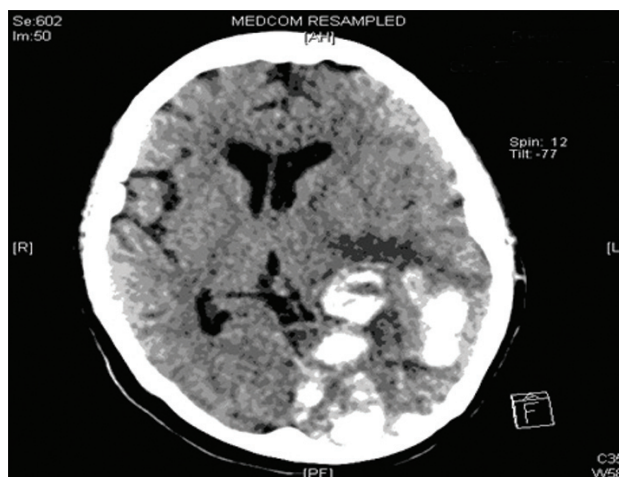
A previously healthy 53-years-old female, presented to emergency department with shortness of breath for two days. The patient was hypotensive with rapid atrial fibrillation (AF) and signs of heart failure (HF). She was stabilized and then admitted to Cardiac Care Unit (CCU) for close monitoring and management. Two days later, she became confused with evolving headache and double vision. The patient was afebrile with normal blood pressure. Cranial nerves examination revealed: papilledema and the right 6th nerve palsy. Otherwise, the rest of neurological examination was unremarkable.

Initial unenhanced computed tomography (CT) of the brain (Fig. 1) showed a massive left occipital and temporal lobe bleeding with cytotoxic edema and mass effect. This CT scan finding was not compatible with the diagnosis of embolic infarction secondary to atrial fibrillation with hemorrhagic transformation as the amount of hemorrhage was disproportionately larger than the size of infarction. Unenhanced T1-weighted MRI confirmed the presence of occipital and temporal lobe hemorrhage with loss of the left transverse sinus flow void (Fig. 2). Gadolinium-enhanced T1-weighted imaging (Fig. 3) showed hyperintensity in the left transverse sinus. MRV (Fig. 4) documented the absence of flow signals in the left transverse sinus. Based on MRI/MRV finding, the diagnosis of left transverse sinus venous thrombosis was made. The patient was started on unfractionated Heparin infusion with partial thromboplastin time range of 1.5X to 2X. Subsequently, the patient underwent serial unenhanced CT examination of the brain over the week of her hospital stay, which revealed no expansion of the lobar hematoma. Indeed, her clinical status has improved. The patient was then started on Warfarin with an adjusted dose to maintain an international normalized ratio (INR) between 2 to 2.5. Unfractionated heparin was subsequently discontinued.

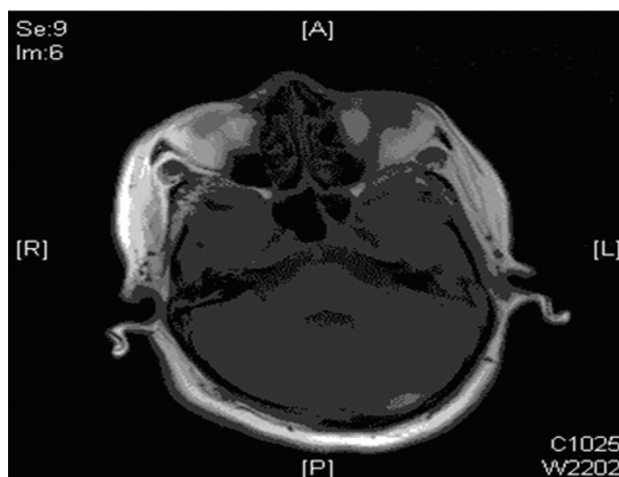
## DISCUSSION

This is a case of left transverse sinus thrombosis with hemorrhagic infarction secondary to hypercoagulable state as a result of HF and dehydration<sup>[8-10]</sup>. The initial diagnostic suspicion was that of an embolic stroke with hemorrhagic transformation secondary to AF<sup>[11]</sup>. However, the amount of the hemorrhage was disproportionately larger than the size

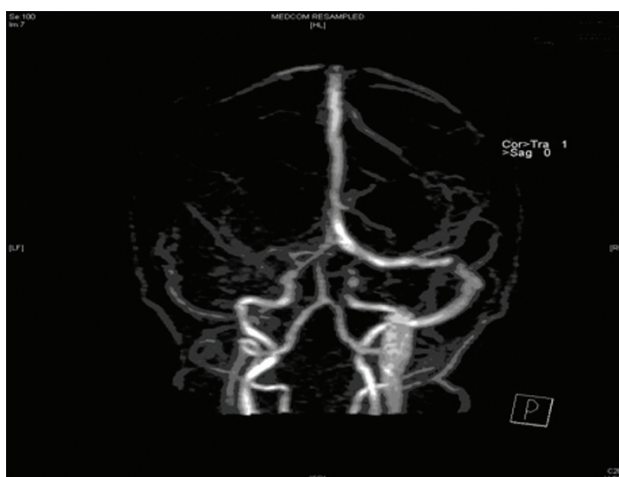
of the CT-detected infarction. Other causes of intracerebral hemorrhage (ICH) were considered and were meticulously excluded<sup>[12]</sup>.



**Figure 1.** Unenhanced CT of the head showing a lobe massive occipital and temporal hemorrhage, surrounding cytotoxic edema and mass effect.



**Figure 2.** Unenhanced T1-weighted MRI of the brain demonstrating hyperintensity in the left transverse sinus.



**Figure 3.** Gadolinium enhanced T1-weighted MRI revealing only partial thrombosis of the left transverse sinus.





**Figure 4.** MRV demonstrating no flow in the LT transverse sinus.

Further evaluation with MRI revealed ICH with absence of the transverse sinus flow void (Fig. 2). Furthermore, Gadolinium enhanced T1-weighted MRI revealed high signal intensity in the left transverse sinus (Fig. 3), which may be otherwise interpreted as normal blood flow within the sinus. MRV documented the absence of flow signals in the left transverse sinus (Fig. 4) that indicates venous sinus occlusion. The high signal intensity seen in the left transverse sinus was due to enhanced thrombus rather than normal flow of gadolinium within the sinus. This finding was confirmed by MRV that showed the absence of flow signal within the left transverse sinus.

**Magnetic Resonance Imaging (MRI) and Magnetic Resonance Venography (MRV)** are considered sensitive and specific non-invasive tool for diagnosing CVSS<sup>[6,7,13,14]</sup>. Classically, MRI with gadolinium may show the filling defect within the occluded sinus or may show peripheral enhancement in acute or sub-acute stages. A more uniform enhancement will be seen in chronic clots due to recanalization or vascularization<sup>[6]</sup>. MRV usually confirm the diagnosis and shows the actual occlusion within the sinus<sup>[15]</sup>.

In the presented case, the thrombus was enhanced in spite of the acuteness of the occlusion. This gave a false impression of the normal flow within the sinus. The clinical presentation of this case was potentially misleading since it was suggestive of an embolic stroke with hemorrhagic transformation secondary to AF. As indicated above that few clinical data did not support this diagnosis with the presence of relatively large volume of hemorrhage compared to the small size of the infarct.

**Cerebral Venous Sinus Thrombosis (CVSS)** should be always considered in cases of unusual intracerebral hemorrhage where detailed MRI/MRV examinations should be acquired.

Physicians should not be confounded by the presence of AF and acclaim all strokes to thromboembolism. This case teaches us that the etiology of stroke should be carefully evaluated, particularly, when there is conflicting clinical or radiological data.

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# THE LATENT POWER OF BITTER MELON ON DIABETES MELLITUS: A CASE STUDY AND LITERATURE REVIEW

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## ABSTRACT

Momordica charantia (known as bitter melon) is a tropical and subtropical vine of cucurbitaceae plant group native to Africa. It is being widely used and advertised for its hypoglycemic effects. However, to date, no large clinical trial has been published on the efficacy of any type of such preparation. The main objective of this case report is to increase the awareness of the latent power of this commonly used herb.

**Keywords:** Momordica charantia, Bitter melon, Diabetes mellitus, Ischemic heart disease.

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## INTRODUCTION

Diabetes mellitus (DM) is a growing problem for many nations in the world [1], and the effort to control it is taking a considerable size of the scientific and governmental attention.

Herbal medicine is a well-known practice worldwide, its effect and potency varies from case to case. Bitter melon is a traditional anti-diabetic supplement that is spreading from the Indian sub-continent to the far-east and to the rest of the world[2]. Although, published data is poor for its efficacy, however, patients still use it[3].

In this case study, we report the extreme effect of this herb that needs to be noticed for its potential effect and hazards.

## CASE REPORT

A report of a 51 years old gentleman presented to the cardiology clinic complaining of intermittent chest discomfort associated with dizziness and sweating, but relieved with rest and sweet intake to rule out ischemic heart disease. He is known to have type two DM diagnosed 17 years ago and peripheral neuropathy.

His blood sugar was reported as uncontrolled 10 months ago due to three events of Emergency Department visits with severe hyperglycemia; his fasting blood sugar at that time was 13.7 and HbA1c 10.3%.

On examination his blood pressure 140/80 mmHg, pulse 79 beat/min regular, respiratory rate 17/min and temperature 37.1°C. Chest, bilateral equal air entry, heart; normal first and second heart sounds and no added sounds. No lower limb edema.

Current medication; he was on oral hypoglycemic tablets (Glibenclamide 5mg po bid, Metformine 500 mg po tid) and insulin (NPH 12 units pm) for 4 years, Vitamin B complex and paracetamol as pain killer. He denied use of over-the-counter medications, tobacco, alcohol, or illicit drugs.

Results of a complete blood cell count, complete metabolic panel, and fasting lipid panel were within normal limits. Renal function and hepatic function were normal.

Fasting blood sugar: 5.1 mmol and HbA1c 7.2%. The normal blood sugar profile was not in keeping with his past history of uncontrolled diabetes, so the patient was asked to discontinue insulin, monitor his fasting blood glucose as he did previously (3–4 times per week), and report any further hypoglycemic events to the clinic.

One week later, he reported to the clinic with 2 readings for fasting blood sugar of 4.2 and 4.4 mmol and one attack of the a similar complain of chest pain. At the time, he was asked to stop all his oral hypoglycemic medication in addition to insulin and to continue monitoring his fasting blood glucose as he did previously. Apart from his previously maintained medications, he was not started on any new medication that can affect the blood sugar.

Three weeks later the patient was seen for follow up. He

denied any more hypoglycemic events despite reported fasting blood glucose readings of 5.1-5.3 mmol over the past 3–4 weeks.

During medication reconciliation, the patient stated that he had been consuming raw bitter melon tablets every day for the past 2 months, which correlated with the development of the hypoglycemia episodes.

Three months later, the patient denied any hypoglycemic events and reported marked improvement of his peripheral neuropathic pain and the other symptoms.

He was still off any pharmacological preparations as hypoglycemic agents, and was taking bitter melon tablets on daily bases; his fasting blood sugar was 5.5 mmol and HbA1c 6.8 and a follow up complete blood cell count, complete metabolic panel, fasting lipid panel, renal and hepatic function were normal.

## DISCUSSION

Bitter melon (*Momordica charantia*) is a plant that grows in tropical areas, including parts of the Amazon, east Africa and Asia, known to be used as food and medicine[3,4]. The fruit looks like a warty gourd, resembling a small cucumber. The young fruit is emerald green, turning to orange-yellow when ripe[3]. The Latin name *Momordica* means “to bite,” referring to the jagged edges of the leaves, which appear as if they have been bitten. All parts of the plant, including the fruit, taste very bitter[5].

The plant has a long history of use for diabetes, tumors, to expel intestinal gas[6], to promote menstruation, and as an antiviral for measles, hepatitis [4,6], and feverish conditions. It is also used to induce abortions and as an aphrodisiac[7]. In addition, bitter melon contains an array of biologically active plant chemicals including triterpenes, proteins, and steroids[7]. *Momordica charantia* has been traditionally use in the dietary management of diabetes. It is to be effective in diabetes through both hypoglycemic and anti-inflammatory effects [9-11]. The hypoglycemic effect is due to insulin like properties of *Momordica charantia* and promotion of hepatic glycogen synthesis[12-14]. This effect has been illustrated by several previous animal and human studies[15-21].

In this report, the patient had symptomatic hypoglycemic attacks while he was taking *Momordica charantia* and at the same time, he was on his usual treatment for diabetes. As a result of that he had frequent symptomatic hypoglycemic attacks. This is very important because patients usually do not consider herbs as medicine, and therefore, he was not bothered to admit the use of *Momordica charantia* to improve his diabetes when he was frequently asked about his medications. In human studies *Momordica charantia* have been used in diabetics in small none randomaized trials and this has supported its use in diabetic patients, as in this patient. Baldwa et al. has studied the effect of *Momordica charantia* on 14 Type 1 and Type 2 diabetic patients. They reported 21.5% reduction in the fasting blood sugar at 30 min. The optimal effect was at 4 hrs with 49.2% reduction

in blood sugar. The effect is fairly long lasting as at 12 hrs, 18% of patients were still showing the hypoglycemic effect of the drug [19]. Welihinda et al. in a study of 18 Type 2 diabetics found that 13.973% had moderate improvement in the glucose tolerance test (GTT)[20].

Similarly Leatherdale et al. have demonstrated both immediate improvement in the blood sugar of diabetic patients and late effect 8% at 8-11 weeks in HbA1c after GTT testing[21]. Srivastava had shown that treatment with *Momordica charantia* when used alone without other hypoglycemia in 7 Type 2 diabetic patients was effective to cause 54% reduction in the mean serum glucose, and a significant reduction in HgA1C,  $p=0.01$  as compared to control[22]. Fuangchan et al. has compared the hypoglycemic effect of *Momordica charantia* to metformin in 129 newly diagnosed diabetic patients; they showed that it has a moderate blood sugar lowering effect, though less than that produced by metformin[23]. One of the major concerns regarding the use of herbs for treatment of medical conditions is that patients consider them completely harmless. This will result in overlooking of their side effects, which could be fatal some times. For example, our patient had significant recurrent hypoglycemia. In fact, Huline et al. and Raman et al. reported cases of severe hypoglycemia with coma and convulsions as complication of the use of *Momordica charantia* for diabetes[24,25]. Others reported other side effects of *Momordica charantia*, such as hemolysis in patients with glucose-6 phosphate dehydrogenase deficiency and gastrointestinal side effect like abdominal pain and diarrhea[6,25,26]. Chest pain as in our patient was not commonly reported as a side effect, but in the report of Dans et al. of 40 patients treated with *Momordica charantia* for diabetes, one patient had chest pain[26]. One more important consideration with the use of *Momordica charantia* or other herbal medicine is there interaction with other medications[27]. Furthermore, it have demonstrated the ability to induce abortions in rats and mice, and its root has been documented as a uterine stimulant in animals[28]. Consequently *Momordica charantia* has been used as abortive and it is contraindicated in pregnancy[29]. It is also transferred through the breast milk; therefore, not advised in women with breast feeding[30]. In addition, it reduces fertility in both males and females and may not be appealing for those who have not completed their family[30]. Finally, the long-term use of this plant may result in the die-off intestinal flora with resulting opportunistic overgrowth *Candida*. The presented patient did not report most of the adverse effect to the plant. However, he has not use the bitter melon long enough to report long-term effects.

## CONCLUSION

Diabetes mellitus as a common and chronic disease, patients tend to experiment multi-modality of treatment including herbal preparations. And the latent power of herbal medicine can show up individually, alarming physicians to educate patients and observe them closely. This treatment may be efficacious, but can lead to severe adverse effects. Therefore,

there is a great need for further a well-designed trial to evaluate the use of this herb in diabetes.

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# CLINICAL IMAGES IN MEDICINE: AN ABNORMAL ELECTROCARDIOGRAM IN A PATIENT WITH CHEST PAIN

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## CASE PRESENTATION

A case study of 70 year old male patient with a history of long standing diabetes mellitus (DM), hypertension, dyslipidemia, peripheral vascular disease, severe ischemic cardiomyopathy with LV ejection fraction of 20% and a left bundle branch block. He presented to the ER complaining of retrosternal chest pain for less than 6 hours associated with shortness of breath, orthopnea and diaphoresis. No paroxysmal nocturnal dyspnea or leg swelling.

His medication used at home were aspirin 81 mg, carvedilol 12.5 mg twice daily, Lisinopril 5 mg daily, Lasix 60 mg daily, Lipitor 20 mg daily and spironolactone 12.5 mg.

On exam, he was diaphoretic, distressed and in pain; his blood pressure was 93/60 mmHg. His heart rate was 65 bpm – regular; jugular venous pressure was elevated. His cardiovascular examination showed normal S1, reverse splitting of S2 and soft systolic murmur at the apex (grade 2/6) radiating to the axilla. His chest exam revealed crackles that are less than 25% of his lung. The rest of his examination was unremarkable. His immediate electrocardiogram (ECG) is shown below (Figure 1). The on call doctor arranged another ECG to help him in the diagnosis (Figure 2).

## Questions

- 1) What abnormalities are seen in the first ECG (Figure 1)
- 2) What's different about the second ECG and what abnormalities it reveals?
- 3) What is the diagnosis?

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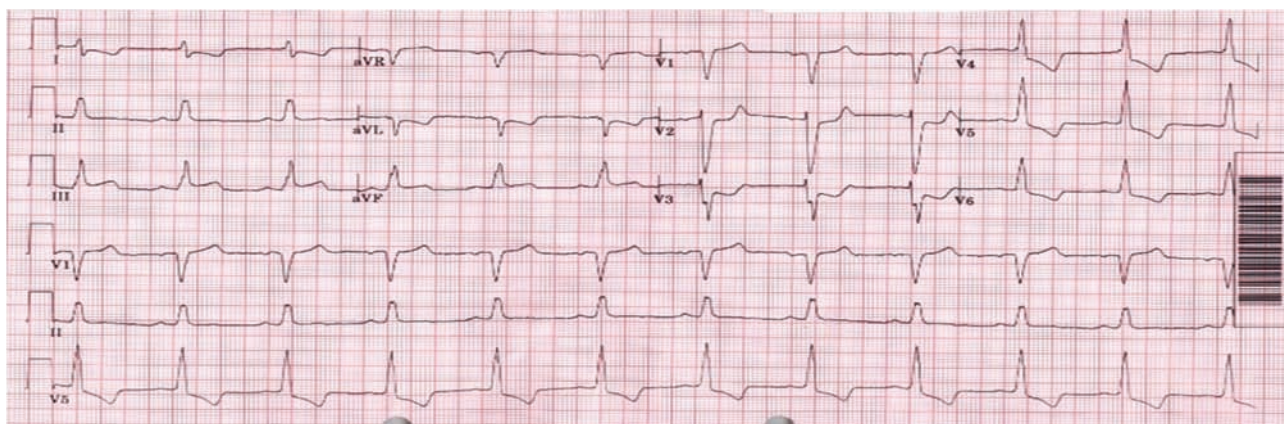


Figure 1.

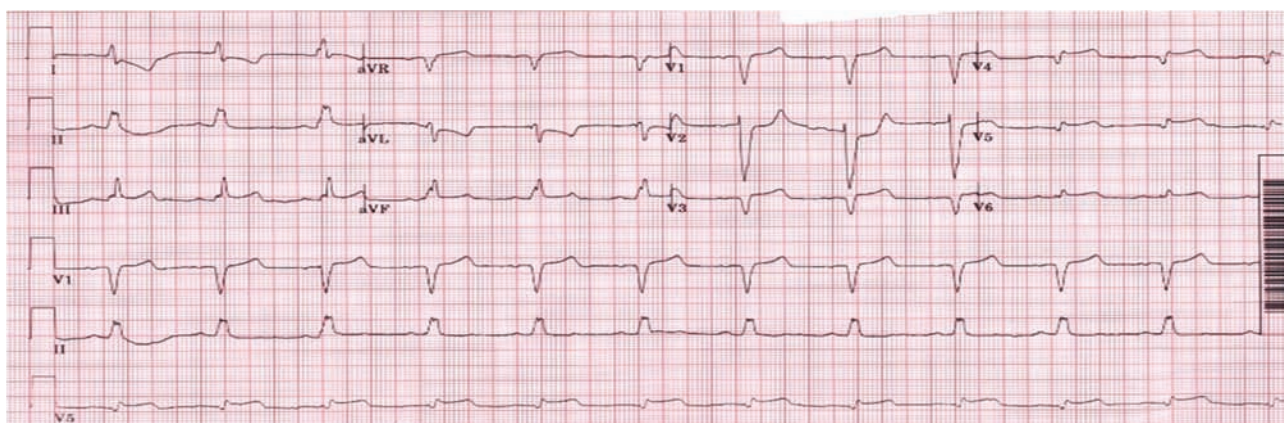


Figure 2.

### ANSWERS AND FOLLOW UP OF THE PATIENT

- 1) Figure 1 showing ECG at presentation with 2 mm concordant ST depression in leads V1-V2 and the 1 mm ST elevation in lead III and aVF in the setting of LBBB.
- 2) Figure 2 showing right sided ECG with ST elevation in lead V4R suggesting the right ventricular infarction.
- 3) His immediate electrocardiogram (Fig. 1) demonstrated acute inferior myocardial infarction in the presence of existing LBBB based on Sgarbossa's criteria<sup>[3]</sup> (Table 1). Right sided ECG showed ST elevation in V4R suggesting right ventricular extension (Fig. 2).

He was commenced on (t-PA) within 15 min from presentation as this is the mode of reperfusion therapy available in the hospital (non cath-lap based hospital), in addition to plavix loading dose and aspirin. Later he was started on low molecular weight heparin.

IV fluid boluses were given to support his hemodynamics and blood pressure which was deteriorating. He was intubated electively and started on inotropic support.

Bedside echocardiography revealed global hypokinesia. A dilated left ventricle with left ventricular ejection fraction of 10% was revealed. His right ventricle was severely hypokinetic, moderate mitral regurgitation. No mechanical

complication noted.

His Troponin-I came back at 177 mg/ml suggesting acute infarction of at least 4-6 hrs.

Patient was considered extremely high risk. He continued to receive full support short of invasive intervention; he however, continued to deteriorate. He later developed asystolic cardiac arrest. All measures to revive him were futile. He died within 4 hrs from presentation.

### DISCUSSION

The optimal use of coronary perfusion therapies depends on a rapid diagnosis of evolving myocardial infarction<sup>[1,2]</sup>. Electrocardiogram is a powerful tool in aiding in the quick diagnosis of the cause of chest pain and selecting the appropriate therapy<sup>[2]</sup>.

The pre-existence of left bundle-branch block (LBBB) in the electrocardiogram may conceal the changes of acute myocardial infarction, which can delay both its recognition and treatment<sup>[3]</sup>. The proportion of patients with LBBB and acute chest pain having an acute myocardial infarction in different studies has been as low as 13 to 32 percent, with a lower incidence in community-based studies compared to clinical trials.

**Table 1.** Odds ratio and scores for independent electrocardiographic criteria according to Sgarbossa's criteria. Minimal score of 3 is required for a specificity of 90 percent.

Criterion	Odds Ratio (95% CI)	Score
ST-segment elevation more than or equal to 1 mm and concordant with QRS complex	25.2 (11.6–54.7)	5
ST-segment depression more than or equal to 1 mm in lead V1, V2 or V3	6.0 (1.9–19.3)	3
ST-segment elevation more than or equal to 5 mm and discordant with QRS complex	4.3 (1.8–10.6)	2

The presence of LBBB in patients with acute myocardial infarction is associated with an increased risk of complications and death<sup>[4]</sup>. When it is new, LBBB is correlated with the occlusion of the proximal left anterior descending artery and a large amount of jeopardized myocardium<sup>[5]</sup>. On the other hand, a prior LBBB is a powerful marker of depressed left ventricular systolic function<sup>[6,7]</sup> and any additional loss of myocardium is likely to result in cardiogenic shock.

In clinical practice, the diagnosis of acute MI may be hindered by the presence of bundle-branch block (BBB), particularly LBBB; therefore, patients with BBB may be less likely to receive standard reperfusion therapy.

In an attempt to assist the clinician in this challenging presentation, Sgarbossa et al.<sup>[3]</sup> have developed a clinical prediction rule to assist in the ECG diagnosis of acute myocardial infarction in the setting of LBBB using specific ECG findings. These investigators analyzed numerous abnormalities previously reported to be suggestive of AMI. He also found 3 specific ECG criteria that were independent predictors of AMI superimposed on LBBB. Furthermore, they devised a probability score for the diagnosis of AMI in the patient with LBBB. The ECG criteria suggestive of AMI with probability score.

#### Include:

1. ST elevation of greater than 1 mm in at least 1 lead, concordant with the QRS complex (score of 5).
2. ST-segment depression of greater than 1 mm in leads with predominantly negative QRS, limited to leads V1, V2, or V3 (score of 3).
3. ST elevation of at least 5 mm, discordant with the QRS complex (score of 2).

Minimal score of 3 was required for a specificity of 90 percent. However, the third criteria requires further validation, since a high take-off of the ST segment in leads V1 to V3 has been described with uncomplicated LBBB, particularly if there is underlying left ventricular hypertrophy. In a sub-study from the ASSENT 2 and 3 trials, the third criteria added little diagnostic or prognostic value<sup>[7]</sup>.

Validations of Sgarbossa's criteria have had variable results<sup>[8-18]</sup>. A meta-analysis of these studies (abstract and poster, but unpublished), found that 2 points or more is 42% sensitive and 87% specific for AMI<sup>[19]</sup>. These studies have generated considerable debate<sup>[1,20]</sup>. The American College of Cardiology and American Heart Association guideline for the

treatment of AMI has previously recommended reperfusion therapy for patients with chest pain and new, or presumably new, LBBB<sup>[21]</sup>. However, the updated version gives no specific recommendation; rather, it suggests using the Sgarbossa's criteria.

## CONCLUSION

Patients with pre-existing LBBB presenting with acute ischemic chest pain may pose a diagnostic challenge which can delay the diagnosis and management. ECG based diagnostic criteria can help in ascertaining the diagnosis in a timely manner.

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