

## **Acute Occlusive Mesenteric Ischemia in Taif Province, Saudi Arabia**

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### **Abstract**

#### **Background:**

Mesenteric ischemia is relatively a rare disorder seen in the emergency department (ED). Due to the effect of hypobaric hypoxia and higher liability for thrombosis encountered in high altitude areas, acute occlusive mesenteric ischemia (AOMI) would represent an actual challenge in Taif and related districts. Another risk factor is that about twenty-five percent of Saudis are victims of diabetes due to the changes in lifestyle and diet leading to increasing levels of obesity. Vague nonspecific clinical findings and limitations of diagnostic studies in addition to cultural and social factors, may lead to late presentation making the diagnosis a significant challenge and in turn higher morbidity and mortality are expected.

#### **Objectives:**

In this study, we review type of AOMI, pattern of presentation, laboratory, radiological, Intraoperative findings and results of treatment in 36 patients who were admitted to King Abdul Aziz Specialist Hospital and King Faisal Hospital, Al Taif, Saudi Arabia from January 2009 to January 2012.

#### **Methods:**

36 patients with final diagnosis of AOMI were included in this retrospective study by means of review of their files and medical records.

#### **Results:**

The disease was more common in men than women (23 male and 13 females). The mean age of patients was 54 years. The mean time of presentation was 2.4 days after occurrence of symptoms. Abdominal pain was the most common symptom of patients followed by nausea, vomiting, constipation and bloody diarrhea. On physical examination; tachycardia was prevalent, Oliguria was seen in approximately 69.4% of patients, 11.1% of patients were in shock status. All patients had abdominal tenderness and 61.1% of patients had marked peritoneal signs (rebound tenderness with guarding or/and rigidity). Twenty one/36 (58.3%) patients were diabetics, 17/36 patients (47.2%) were hypertensive and 8/36 patients (22.2%) with associated cardiac disorders. In laboratory tests, Leukocytosis was present in all patients. Secondary polycythemia was seen in 38.9% of patients. D-Dimer level was high in all patients. In 61.1% of patients, exploratory laparotomies were done based on clinical, laboratory, abdominal ultrasound and plain x-ray findings without performing CT angiography due to presentation with marked peritoneal signs. In all patients gangrenous lesions were detected during surgery and resection of these parts was done. Gangrene and in turn resection, was extensive in 14/36 patients (38.9%) and they developed short bowel syndrome. There were 22/36 patients (61.1%) with superior or/and inferior mesenteric vein thrombosis, 10/36 patients (27.8%) with superior mesenteric artery thrombosis, in one of them there is associated focal thrombosis of aorta and renal arteries and 4/36 patients (11.1%) with superior mesenteric artery embolism. All patients received postoperative anticoagulant therapy. Patients with short bowel syndrome were prepared to receive total parental nutrition (TPN) for life. Intra-operative deaths were 3/36

(8.3%). There were 5/36 deaths (13.9%) accruing within one month after surgery and all died secondary to sepsis and its sequelae with total deaths of 8/36 patients (22.2%).

### **Conclusion:**

Acute occlusive mesenteric ischemia (AOMI) especially of venous type will represent a challenging problem in Taif and related districts. The surgeon must pay intensive attention to patients presented by unexplained central abdominal pain and he has to be with high index of suspicion especially if it meets with the classic teaching of "pain out of proportion to physical findings". Early diagnosis, aggressive approach to early resuscitation of the patients, correction of metabolic and hemodynamic derangements, and performing laparotomy as soon as these derangements were corrected would decrease morbidity and mortality. In some patients it is necessary to perform second look operation for re-evaluation of the viability of the intestine.

**Keywords:** Mesenteric ischemia, Taif, Saudi Arabia

### **Introduction**

Mesenteric ischemia was first described by Antonio Benivene in the 15th century and later by Virchow in the 19th century (Boley et al, 1997). The incidence of AMI is increasing parallel to the ageing patient population (Ritz et al, 2005). Ottinger and Austen, (1967) reported a rate of 8.8 cases of AMI per 10,000 hospital admissions. Stoney and Cunningham, (1993) in later years observed an incidence rate of 1 in 1000 hospital admissions. Mortality rates for elderly population over the age of 60 carries a relative risk ratio of 3:1 compared to younger patients (Ritz et al, 2005). Early intervention is crucial and the potential for intestinal viability is 100% when symptoms are less than 12 hours, 56% if symptoms are 12 to 24 hours and only 18% if symptoms have been neglected for over 24 hours before diagnosis (Huang et al, 2005). Earlier in the last century, it was felt that in acute mesenteric ischemia (AMI) "the diagnosis is impossible, the prognosis hopeless and the treatment useless" (COKKINS, 1926). The same attitude is shared by many and is reflected in the words "mortality rate for patients with AMI will probably always remain high" (Deehan et al, 1995). In high altitude environment (like in Taif province), the effect of hypobaric hypoxia on coagulation system and in particular, increased factor VIIa activity, in addition to dehydration, polycythemia and vascular spasms may lead to a higher liability for thrombosis, which may be also involved in the increased tendency to mesenteric thrombosis (Bendz et al, 2000 and Mubarak et al, 2012). Vague nonspecific clinical

findings and limitations of diagnostic studies in addition to cultural and social factors, may lead to late presentation making the diagnosis a significant challenge and in turn higher morbidity and mortality are expected (Mubarak et al, 2012). However, though the results of surgical treatment of AOMI remain unsatisfactory, improved imaging and thrombolytic therapies hold much promise (Kougias et al, 2007). The severity of injury depends on etiology of ischemia, systemic blood pressure, collateral circulation flow, response of mesenteric vessels to autonomic stimulators, amounts of circulatory autonomic stimulators, regional hormonal factors, presence of cellular metabolites after reperfusion of the ischemic bowel, and duration of ischemia (Deehan et al, 1995). Four pathologic factors have been described as the cause of acute mesenteric ischemia including: superior or inferior mesenteric artery emboli, thrombosis of these vessels, venous thrombosis, and non occlusive mesenteric ischemia (Lock, 2002 and Baeshko et al, 2004). Emboli are the most common cause of AMI (Baeshko et al, 2004). Appropriate diagnosis of this disease depends on a high clinical suspicion particularly in elderly patients who has history of cardiovascular disease (Yasuhara, 2005). Appropriate resuscitation of the patient and diagnostic studies and early intervention is the most effective approach to save the patient (Wyers, 2010). Non surgical interventions are still investigatory, however, recent studies have shown that angiography and vasodilator or thrombolytic agent injection before appearance of

peritoneal signs or hemodynamic derangements, has had suitable results and may replace surgical intervention in a large number of those patients (Rosow, et al, 2005). At this time, appropriate surgical intervention, embolectomy, thrombectomy, vascular bypass, and resection of frankly gangrenous bowel and second look is the standard treatment of this fatal disease (Kougias et al, 2007). In this study, we reviewed the data of 36 patients who were admitted to King Abdul Aziz Specialist Hospital and King Faisal Hospital, Taif, Saudi Arabia from January 2009 to January 2012 with AOMI.

### **Materials and Methods:**

In this retrospective study, we reviewed the hospital records of all patients with acute occlusive mesenteric ischemia admitted to King Abdul Aziz Specialist Hospital and King Faisal Hospital, Taif, Saudi Arabia from January 2009 to January 2012. Thirty six patients with final diagnosis of AOMI were included in this study. We excluded cases of non occlusive acute mesenteric ischemia (NOAMI) and non vascular causes of strangulation. We reviewed age, gender, type of AOMI, pattern of presentation, laboratory, radiological and Intraoperative findings in addition to results of treatment and follow up data if available in the 36 patients included in the study.

### **Results:**

There were 23/36 men (63.9%) and 13/36 women (36.1%). The mean age of patients was 54 (range 32-81) years. The mean time of presentation was 2.4 days (range from 26 hours to 7 days) after occurrence of symptoms. All of the 36 patients (100%) had abdominal pain which had sudden onset in 12/36 patients (33.3%) and the pain was of more gradual onset in 24/36 patients (66.7%). Thirty four patients (94.4%) had nausea, 32/36 patients (88.9%) had vomiting, 23/36 patients (64.1%) had absolute constipation and 7/36 patients (19.4%) had bloody diarrhea. On physical examination, oral temperature was normal in 29/36 patients (80.5%) and in 7/36 patients (19.5%) there was fever. 11.1% of patients (4/36) were in shock status and the mean systolic blood pressure on admission was 113.8 mm Hg with

Mean diastolic blood pressure of 67.3 mm Hg. Tachycardia was prevalent in all patients and the mean pulse rate was 106.8 per minute. Oliguria was seen in approximately 69.4% of patients (25/36). All patients had abdominal tenderness and 61.1% of patients (22/36) had marked peritoneal signs (rebound tenderness with guarding or/and rigidity). Twenty one/36 patients (58.3%) were diabetics, 17/36 patients (47.2%) were hypertensive and 8/36 patients (22.2%) with associated cardiac disorders. In laboratory tests, Leukocytosis was present in all patients (100%). Secondary polycythemia was seen in 38.9% of patients (14/36). Hemoglobin was high in 14/36 patients (38.9%), normal in 10/36 patients (27.8%) and low in 12 patients (33.3%) the mean hemoglobin level was 14.5 gm/100 ml. D-Dimer level was high in all patients (higher than 3 µg fibrinogen equivalent units/mL). In 61.1% of patients exploratory laparotomies were done based on clinical, laboratory, abdominal ultrasound and plain x-ray findings without performing CT angiography due to presentation in advanced stage, 14/36 patients (38.9%) had abdominal CT angiography with contrast and preoperative diagnosis of mesenteric venous thrombosis is detected in 10/14 patients (71.4%), and mesenteric artery thrombosis in 4/14 patients (29.6%). Intra operative diagnosis of 22/36 patients (61.1%) to have superior mesenteric vein thrombosis, 10/36 patients (27.8%) with superior mesenteric artery thrombosis, in one of them there is associated focal thrombosis of aorta and renal arteries. Gangrene was extensive in 14/36 patients (38.9%) and they developed short bowel syndrome. Second look operation was performed in 8 cases from which 6 patients survived with significant relation to survival. All patients received postoperative anticoagulant therapy. Patients with short bowel syndrome are prepared to receive total parenteral nutrition (TPN) for life. Intra-operative deaths were 3/36 (8.3%). There were 5/36 deaths (13.9%) accruing within one month after surgery and all died secondary to sepsis and its sequelae with total perioperative deaths of 8/36 patients (22.2%).

**Table 1: Demographic data.**

Gender	Number of patients (%)
Male	23/36 (63.9)
Female	13/36 (36.1)
Age	years
Mean	54

**Table 2: Clinical findings.**

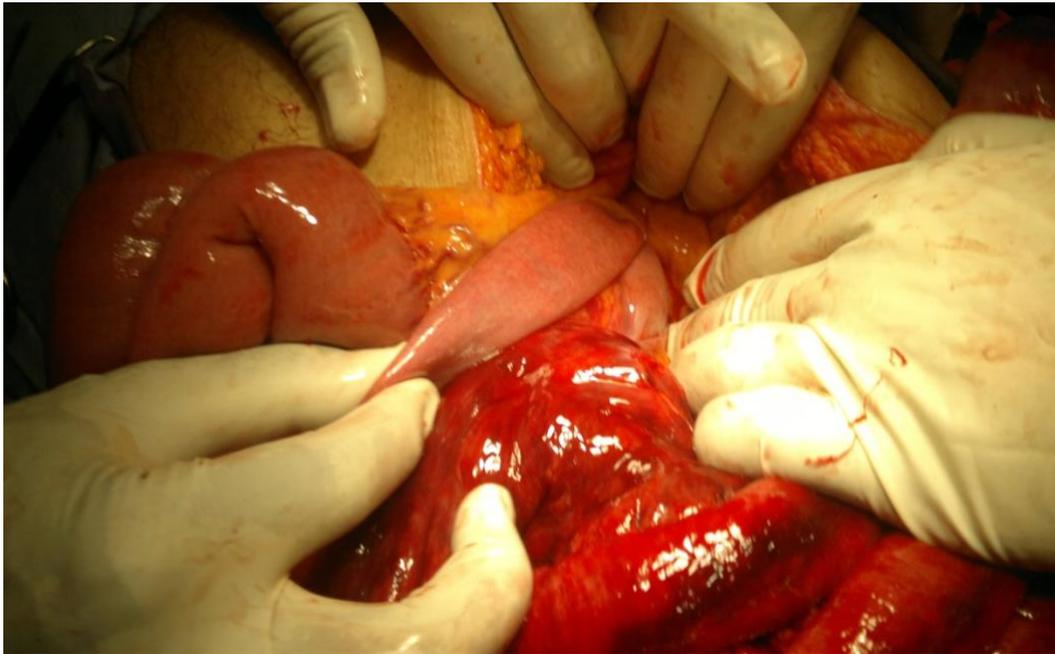
Finding	Number of patients (%)
<b>Abdominal pain:</b>	36 (100)
Sudden onset	12/36 (33.3)
More gradual onset	24/36 (66.7)
<b>Nausea</b>	34/36 (94.4)
<b>Vomiting</b>	32/36 (88.9)
<b>Absolute constipation</b>	23/36 (64.1)
<b>Bloody diarrhea</b>	7/36 (19.5)
<b>Normal oral temperature</b>	29/36 (80.5)
<b>Fever</b>	7/36 (19.5)
<b>Shock</b>	4/36 (11.1)
<b>Tachycardia</b>	36 (100)
<b>Oliguria</b>	25/36 (69.4)
<b>Abdominal tenderness</b>	36 (100)
<b>Rebound tenderness and guarding or /and rigidity</b>	22/36 (61.1)
<b>Diabetes</b>	21/36 (58.3)
<b>Hypertension</b>	17/36 (47.2)
<b>Cardiac disorders</b>	8/36 (22.2)

**Table 3: Diagnostic tools.**

Finding	Number of patients (%)
<b>Laboratory tests:</b>	
<b>Leukocytosis</b>	36 (100)
<b>Secondary polycythemia</b>	14/36 (38.9)
<b>Hemoglobin (mean 14.5 gm/100 ml)</b>	
High	14/36 (38.9%)
Normal	10/36 (27.8%)
Low	12 (33.3%)
<b>D-Dimer level (&gt; 3 µg fibrinogen equivalent units/mL) CT angiography</b>	36 (100)
	14/36 (38.9%)

**Table 4: Final Diagnosis**

Finding	Number of patients (%)
<b>Superior mesenteric vein thrombosis</b>	22/36 (61.1)
<b>Superior mesenteric artery thrombosis</b>	10/36 (27.8)
<b>Superior mesenteric artery embolism</b>	4/36 (11.1%)



**Figure 1:** showing marked congestion with early gangrenous changes in ileum due to mesenteric vein thrombosis.

### **Discussion:**

There is no doubt that there is a higher liability for thrombosis amongst population of high altitude areas (Bendz et al, 2000 and Mubarak et al), making acute occlusive mesenteric ischemia (AOMI) to be a surgical challenge in Taif and related districts. Another risk factor is that about twenty-five percent of Saudis are victims of diabetes due to the changes in lifestyle and diet leading to increasing levels of obesity (Karim et al, 2000). In this study, there were 23/36 men (63.9%) and 13/36 women (36.1%), other studies reported that the disease is more common in women (Acosta et al, 2004). The mean age of patients was 54 years which is approximately 15 years younger, in comparison to similar studies (Ritz et al, 2005). The mean time of presentation was 2.4 days after occurrence of symptoms (range from 26 hours to 7 days), it is clear that delay in presentation will affect morbidity and survival and it is related to educational, social and environmental factors (Huang et al, 2005 and Mubarak et

al, 2012). Abdominal pain was the most common symptom of patients followed by nausea, vomiting, constipation, bloody diarrhea. These data are comparable to that reported in other studies (Huang et al, 2005). On physical exam oral temperature was normal in most of patients (80.5%) and in 19.5% there was fever. 11% of patients were in shock status, while, only 30.6% of patients had adequate urinary output (> 30cc per hour) which has significant relation to mortality rate. In fact, patients with normal urinary output have more chance to survive comparing to those with less urinary output volume (Deehan et al, 1995). It emphasizes on importance of appropriate resuscitation before operation (Yasuhara, 2005). All patients had abdominal tenderness and 61.1% of patients had marked peritoneal signs (rebound tenderness with guarding or/and rigidity) reflecting the delayed onset of presentation which had significant relation to mortality. Other studies show an earlier pattern of presentation which

may be related to different cultural and ecological factors (Baeshko et al, 2004). Associated risk factors are diabetes mellitus and hypertension and there relations to accelerated process of atherosclerosis, increased liability to thrombosis must be considered (Karim et al, 2000). Cardiac disorders, especially ischemic heart disease and atrial fibrillation were closely related to embolic cases encountered in this study; however, the incidence of embolism is much lower in this series than reported in the literature (Acosta et al, 2004). Laboratory tests; Leukocytosis was present in all patients. Secondary polycythemia was seen in 38.9% of patients (14/36). The mean hemoglobin level was 14.5 gm/100 ml. These data are non specific and not related to the mortality. D-Dimer level was high in all patients (higher than 3 µg fibrinogen equivalent units/mL). Several studies have shown that D-Dimer assay would have a high negative predictive value, and D-Dimer testing may be useful for the exclusion of patients with suspected AOMI (Altinyollar et al, 2006). Abdominal x rays which were performed in patients had no specific findings. There is no significant relation between final diagnosis and mortality rate but it is significantly related to the length of gangrenous lesion, however, the most common encountered lesion was mesenteric venous thrombosis (61.1%), and similar findings are reported by Mubarak et al, (2012). Second look operation was performed in 8 cases from which 6 patients survived with significant relation to survival . Similar data are reported by Kaminsky et al, 2005 (Kaminsky et al, 2005).

**Conclusion:** Acute occlusive mesenteric ischemia (AOMI) especially of venous type will represent an actual problem in Taif and related districts so. The surgeon

must pay intensive attention to patients presented by unexplained central abdominal pain and he has to be with high index of suspicion especially if it meets with the classic teaching of "pain out of proportion to physical findings ". Early diagnosis, aggressive approach to early resuscitation of the patients, correction of metabolic and hemodynamic derangements, and performing laparotomy as soon as these derangements were corrected will decrease morbidity and mortality. In some patients it is necessary to perform second look operation for re-evaluation of the viability of the intestine and removal of any detected gangrenous lesion. Accurate postoperative monitoring of the patient is critical with anticoagulant treatment and oral feeding should be started without delay. In this situation TPN may be helpful in managing the patient, If short bowel syndrome or other complications of bowel resection occur, continuing the TPN until bowel adaptation is recommended.

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## الملخص العربي القصور الأندادى الحاد للدورة الدموية للأمعاء فى منطقة الطائف بالمملكة العربية السعودية

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من النادر نسبيا رؤية حالات مرض القصور فى الدورة الدموية للأمعاء. لكن نظرا لقلّة الأكسجين تحت الضغط المنخفض فى الأماكن المرتفعة مع زيادة احتمالات تكون الجلطات فإن هذا المرض يمثل مشكلة حقيقية فى منطقة الطائف وماحولها. وهناك عامل خطورة آخر وهو ان حوالى 25% من السعوديين هم ضحايا لمرض السكرى وذلك لتغير النمط المعيشى والعادات الغذائية مع زيادة نسبة السمنة. إن الأعراض المبهمة للمرض ومحدودية الوسائل التشخيصية بالإضافة للعوامل الثقافية و البيئية قد تؤدى إلى تأخر التشخيص ومن ثم ارتفاع نسبة المضاعفات والوفيات. وقد قمنا باجراء هذه الدراسة عن طريق فحص السجلات الطبية ل 36 مريضا بقصور حاد فى الدورة الدموية للأمعاء .

والذين أدخلوا لمستشفى الملك عبدالعزيز ومستشفى الملك فيصل التخصصى بالطائف من يناير 2009 وحتى يناير 2012. وقد وجد أن المرض أكثر إنتشارا فى الرجال عن النساء وأن متوسط العمر بينهم كان 54 سنة. وكانت آلام البطن هي أكثر الأعراض حدوثا تلاها الرغبة فى القيء والقىء والإمساك التام ثم الإسهال الدموى. ومعظم الحالات جاءت متأخرة بعد حدوث علامات تهيج الغشاء البريتونى الشديد. ومعظم الحالات كانت تعاني من قلة إدرار البول مع زيادة فى النبض أما الصدمة فلم تزيد عن 4% وكانت أكثر الأمراض المصاحبة هي مرض السكرى و ارتفاع الضغط واضطرابات القلب. وقد كانت هناك زيادة فى عدد كرات الدم البيضاء فى كل الحالات وكانت أكثر من 20000 لكل مل فى نصف الحالات. وكان هناك زيادة ثانوية فى عدد كرات الدم الحمراء بنسبة 38,9%. ولوحظ ارتفاع معدل الدي-دايمر فى كل الحالات. وقد اعتمد التشخيص فى 61,1% من الحالات على الناحية الأكلينيكية والفحوصات المعملية والموجات فوق الصوتية والأشعة العادية على البطن ثم الاستكشاف الجراحى ولم يتسنى إجراء أشعة مقطعية بالصبغة الا فى 38,9% من الحالات لوصول المرضى بعد حدوث تهيج بريتونى شديد. وقد وجدت غرغرينة فى كل الحالات وقد تم إستئصال الأجزاء المصابة وكانت الغرغرينة شديدة فى 38,9% من الحالات وبالتالي أدى استئصالها إلى حدوث متلازمة الأمعاء القصيرة. وتم تشخيص جلطات الوريد المساريقي الأعلى للأمعاء فى 61.1% وفى الشريان المساريقي الأعلى فى 27.5% من الحالات اما اصابة الشريان المساريقي الأعلى بجلطات منتقلة من مكان اخر فقد حدثت فى 11.1% من الحالات. وقد تلقى المرضى بعد العملية العلاجات المانعة للتجلط وتم إعداد المرضى المصابين بمتلازمة الأمعاء القصيرة لتلقى التغذية عن طريق الوريد مدى الحياة. وكانت حالات الوفاة أثناء العملية 3 حالات وفى خلال الشهر الأول بعد العملية 5 حالات باجمالى 8 حالات (22.2%) فى فترة ماحول العمليات.

**خاتمة:** إن القصور الأندادى الحاد للدورة الدموية للأمعاء وبالذات الوريدي يمثل تحدى جراحى حقيقى فى منطقة الطائف ويتوجب على الجراح أن يكون منتبها بشدة لآلام البطن الحادة وبالذات التى تكون شديدة بصورة لا تتناسب مع العلامات الاكلينيكية. فالتشخيص المبكر مع اعطاء المحاليل واصلاح اضطرابات الدورة الدموية ثم استكشاف البطن واجراء التدخل الجراحى المناسب قد يقلل من المضاعفات والوفيات. وقد يستدعى الأمر فى بعض الحالات إعادة استكشاف البطن واستئصال أى أجزاء مصابة بالغرغرينة من الأمعاء.