

Letters to the Editor

Pattern of Referrals from a General Hospital to a Regional Tertiary Health Institution: Samtah Experience

To the Editor: The Kingdom of Saudi Arabia has achieved a remarkable growth in the health sector in the last two decades. The health care delivery system is based on a structured hierarchy comprising primary, secondary and tertiary health institutions. Each of these institutions has facilities and relatively defined responsibilities beyond which there is usually a need for referral to a higher center.¹ Reports on the pattern of referrals from one health institution to the other are scanty. Data obtained from such analysis is useful for health care planning and for maximization of benefits from existing facilities.

We reviewed the records of 1000 consecutive inpatients referred from Samtah General Hospital (SGH) to King Fahd Central Hospital (KFCH), Gizan region's tertiary health institution, during the period 1993 to 1995. SGH is a 100-bed modern hospital and serves a population of approximately 174,000 people.

During the study period, there were 21,889 admissions. The 1000 referrals constituted only 4.6% of these admissions. About 87% of these referrals were from the departments of Medicine, General Surgery, Orthopedics and Pediatrics. The department of Obstetrics and Gynecology contributed only 1.2%. The most common disease groups referred were injury and poisoning (38.2%), diseases of the circulatory system (20.0%), the genitourinary system (8.9%), digestive system (7.3%), the nervous system (6.3%) and neoplasms (5.6%).

In the injury and poisoning group, proximal femoral fractures, head injury, and burns were the most common (29.3%). Among circulatory disorders, acute myocardial infarction and cerebrovascular diseases were the most frequent reasons for referral (17.5%). End-stage renal disease (ESRD) was the most common genitourinary problem referred (6.1%), while upper gastrointestinal (UGI) hemorrhage and gallbladder disease (GBD) were the most frequent digestive disorders (4.8%). The most common neoplasm referred was hepatocellular carcinoma (1.3%) (Table 1).

Fewer than 5% of the patients admitted to SGH during the period under review were referred to KFCH for further investigations or management. This represents a low referral rate, and is probably a reflection of the optimal utilization of facilities in the hospital. Despite this, it was necessary for some departments to refer cases which could not be fully investigated or treated due to lack of appropriate facilities. This was especially evident in the management of patients with head injuries, cerebro-

TABLE 1. Major indications for referrals (1000 cases).

Diagnosis	ICD-10	No.
Proximal femoral fractures	S72.1 and 72.2	124
Head injuries	S00 - S09	122
Acute myocardial infarction	I21	95
Cerebrovascular accident	I60-69	80
End-stage renal disease	N18.0	61
Burns	T20-25	47
UGI hemorrhage	K92.0-92.2	29
Gallbladder disease	K80 and 82	19
Hepatocellular carcinoma	C22.0	13

ICD-10=10th Revision of the International Classification of Diseases.

vascular accidents (CVA), proximal femoral fractures, myocardial infarction, upper gastrointestinal hemorrhage and burns.

Head injuries are very common in our practice. In this series, a considerable number of patients (12.2%) referred to KFCH were for head injuries that required CT scan, a facility that is not available in our hospital. A further need for referral of patients for CT scan in our study was for CVAs (8%). When added to those sent because of head injuries, CT scan was the most common indication for referral (20.2%).

A considerable number of the older population present with proximal femoral fractures because of senile and postmenopausal osteoporosis.² Rigid internal fixation, followed by early mobilization, which is now the treatment of choice for most of these fractures, requires image intensification. As this is not available in our hospital, this group of patients were all referred to KFCH. Acute myocardial infarction was the third most common indication for referral (9.5%). All were patients judged suitable for thrombolytic therapy, which is not available at SGH. Thrombolysis is most beneficial in the first six hours after infarction.³ Institution of this therapy in SGH, which is one hour's travel time away from KFCH, would increase the chances of patients' survival and reduce the referral rate to KFCH.

Chronic hepatitis B and C virus infections and their sequelae are highly prevalent in Gizan.^{4,5} In most of our patients with UGI bleeding, the cause is esophageal varices. Occasionally, it is due to a bleeding duodenal ulcer (DU). Since our endoscopy service is not equipped for therapeutic intervention, these patients are often referred to KFCH after the initial resuscitative measures. Upgrading our endoscopy service will no doubt enable us to provide prompt and definitive treatment to such patients.

Burns of less than 20% of body surface can be safely managed in the surgical wards of general hospitals. However, when the head, face, or perineum or more than

20% of the body surface is involved, better results are obtained if the patients are managed in a specialized burn unit. The establishment of such a unit allows for a concentration of facilities and optimal timing of any desired surgical intervention. The 47 cases referred in our series (4.7%) were those with more than 20% burns who were considered to have a reasonable chance of functional as well as cosmetic recovery if treated in a specialized burn unit.

Most of the ESRD patients who were referred to KFCH were done so for the creation or revision of arteriovenous fistulae, as we did not have a vascular surgeon during part of the period reviewed. Occasionally, the attitudes and preferences of patients or their relatives may influence referral to a tertiary health institutions. For instance, while facilities may be available in the general hospitals for open cholecystectomy, patients may prefer to have laparoscopic cholecystectomy in the tertiary centers. A further factor is the awareness of the existence of highly specialized medical facilities in the tertiary institutions at no cost to the patients. This may lead to unnecessary demands for referrals to such institutions when the existing facilities in the general hospitals may be adequate.⁶ It is hoped that with better communication from health providers, such demands will be reduced.

It is essential that the highly specialized services offered at the tertiary level hospitals are not overburdened by undeserving referrals. While our referral rate in the period reviewed was reasonably low, we feel that further reductions can be achieved by the provision of a CT scanner, an image intensifier, facilities for thrombolysis, and a fully equipped endoscopy unit in our hospital. Additional benefits that may accrue from this will be the savings on transport and manpower required for the transfers, and the availability of some of the above investigation and treatment options for patients who are otherwise too ill to be moved.

Thomas Okonkwo, FRCS, FICS
Department of Orthopedic Surgery
Aderemi Aderoju, MB, FRCP
Dan Ene, MD, FRCP
Department of Medicine
Ignatius Aboh, FRCS, FICS
Department of Surgery
Samtah General Hospital
Samtah, Gizan
Saudi Arabia

References

1. Al-Mazrou YY, Al-Shammari SA, Siddique M, Jarallah JS. A preliminary report on the effect of referral system in four areas of the Kingdom of Saudi Arabia. *Ann Saudi Med* 1991;11:663-8.

2. Sadat-Ali M, El-Hassan AY, Ibrahim EM, Al-Freih H, Al-Muhanna F. Postmenopausal osteoporosis in Saudi women: a pilot screening. *Ann Saudi Med* 1993;13:272-4.
3. Birkhead JS. Time delays in provision of thrombolytic treatment in six district hospitals. *BMJ* 1992;305:445-8.
4. Al-Faleh FZ. Hepatitis B infection in Saudi Arabia. *Ann Saudi Med* 1988;8:474-80.
5. Bakir TMF. Age-specific prevalence of antibodies to hepatitis C virus (HCV) among the Saudi population. *Saudi Med J* 1992;13:321-4.
6. Umeh JC. A case for high-cost medical case management in Saudi public hospitals. *Saudi Med J* 1996;17:693-7.

Methemoglobinemia Induced by Accidental Ingestion of Nitrite

To the Editor: Razzak¹ has described an interesting case of methemoglobinemia in a child, and discussed the pathophysiology as well as management in an instructive manner. I would like to add the following: 1) In addition to ingestion or contact, inhalation of certain oxidizing agents/chemicals or drugs may lead to life-threatening methemoglobinemia in otherwise normal individuals;² 2) infants under five months of age are particularly susceptible because of their physiologically low levels of NADH-dependent methemoglobin reductase;³ 3) at the end of the case report the author mentions that methemoglobinemia should be considered in the differential diagnosis of "cyanosis not responding to oxygen therapy." In fact it should be "cyanosis not responding to 100% oxygen therapy;"² and 4) while dealing with a case of cyanosis or methemoglobinemia, consider the use of native medicines containing oxidizing agents, as reported by Mallouh and Sarette.²

P. Thirumalaikolundusubramanian

Samtah General Hospital
Samtah, Gizan
Saudi Arabia

References

1. Razaq QM. Methemoglobinemia induced by accidental ingestion of nitrite. *Ann Saudi Med* 1998;18:54-5.
2. Mallouh AA, Sarette WO. Methemoglobinemia induced by topical hair oil. *Ann Saudi Med* 1993;13:78-80.
3. Lukens JN. The legacy of well water. *JAMA* 1987;257:2793-5.

Reply

To the Editor: I would like to thank Dr. Thirumalaikolundusubramanian for the helpful comments on the above case report. With regards to his first point, inhalation of methemoglobinemia-producing agents is mentioned in the introduction. On the second and fourth points, I agree entirely that young infants are particularly susceptible to methemoglobinemia, and that it should certainly be considered when dealing with cyanosis after the use of native medicines. With regards to the third point, what I

meant by oxygen therapy was that the patient should be given the highest concentration of oxygen possible, and for most patients this would mean an inspired oxygen approaching 100%.

Dr. Q.M. Razzaq, FRCS
32 Fuller Road, Watford
Hertfordshire WD2 5QN
U.K.

Genotyping of Hepatitis C Virus Isolates from Saudi Patients

To the Editor: We greatly appreciate Al-Ahdal et al.¹ for their genotyping work. Genotyping is primarily useful for phylogenetic and epidemiologic studies of the virus. As the genotype represents only a small portion of the viral genome, it would be unusual for the genotype to be fully informative with regards to the disease-producing potential of the viron.² However, the idea of the authors to associate genotyping with disease severity and management should be welcomed.

Analysis of the published studies has yielded a mixed bag of results (positive, borderline, negative and confirming), ranging from some relationship between genotype and disease, to outright rejection of any relationship between genotype and prognosis of the disease.² So to understand the association between genotype and disease (with reference to clinical presentation, course, response to therapy and prognosis), we have to identify a test that can define prognosis with a sensitivity and specificity of at least 95%.

A. Uma, MD
Additional Professor, Microbiology
Madurai Medical College
Madurai, India

P. Thirumalaikolundusubramanian, MD
Samtah General Hospital
Samtah, Gizan
Saudi Arabia

References

1. Al-Ahdal MN, Rezeig MA, Kessie G. Genotyping of hepatitis C virus isolates from Saudi patients by analysis of sequences from PCR-amplified core region of the virus genome. *Ann Saudi Med* 1997;17:601-4.
2. Gambino R. Hepatitis C genotypes: can we correlate viral genotypes and disease? *Biotech Lab Intl* 1997;2:17-8.

Reply

To the Editor: The comments of Drs. Uma and Thirumalaikolundusubramanian related to our paper¹ are

appreciated. It is generally agreed that the relationship between the clinical consequences of hepatitis C virus (HCV) infection and HCV genotypes has, thus far, eluded precise description.² Nevertheless, speculative conclusions have been drawn from HCV genome sequence analysis in patients with chronic HCV infection. On the other hand, some relationships between HCV genotypes and response to interferon (IFN) treatment have been demonstrated. A poor response to IFN- α was reported with HCV-1b strains identical to the prototype HCV-J and with HCV-4.^{4,5} It is felt that the molecular analyses of HCV gene sequences will eventually contribute to the advancement of knowledge of viral hepatitis C, not only in the epidemiological field but in the clinical arena as well.

Mohammed N. Al-Ahdal, PhD

Department of Biological and Medical Research, MBC-03
King Faisal Specialist Hospital and Research Centre
P.O. Box 3354
Riyadh 11211, Saudi Arabia

References

1. Al-Ahdal MN, Rezeig MA, Kessie G. Genotyping of hepatitis C virus isolates from Saudi patients by analysis of sequences from PCR-amplified core region of the virus genome. *Ann Saudi Med* 1997;17:601-4.
2. Kiyosawa K. The value of hepatitis C virus genotyping to epidemiological and clinical studies (editorial). *J Gastroenterol Hepatol* 1997;12:623-4.
3. Blum HE. Hepatitis viruses: genetic variants and clinical significance. *Int J Clin Lab Res* 1997;27:213-24.
4. Enomoto N, Sakuma I, Asahina Y, et al. Mutations in the nonstructural protein 5A gene and response to interferon in patients with chronic hepatitis C virus 1b infection. *N Engl J Med* 1996;334:77-81.
5. El-Zayadi A, Simmonds P, Dabbous H, et al. Response to IFN α of Egyptian patients infected with hepatitis C virus genotype 4. *J Viral Hepat* 1996;3:261-4.

A Late Presentation of Postpneumonectomy Pleural Empyema and Bronchopleural Fistula

To the Editor: Bronchopleural fistula (BPF) is a rare but serious complication after pneumonectomy. The recognition and diagnosis of bronchial stump disruption can be very difficult and may lead to a delay in the management of this life-threatening condition. Modern high-technology imaging techniques, such as fiberoptic bronchoscopy, computed tomography and ventilation scintigraphy, are generally used to identify the site of persistent air leakage. Bronchography is rarely of value in detecting small leaks, but has been useful in the demonstration of large ones.¹ We would like to highlight the use of methylene blue as a safe, effective and relatively noninvasive means of confirming the diagnosis of an occult postpneumonectomy BPF with pleural empyema. Little attention has been paid to this simple bedside test since 1955, when Franz et al. reported a 33.3% yield in their 24 patients

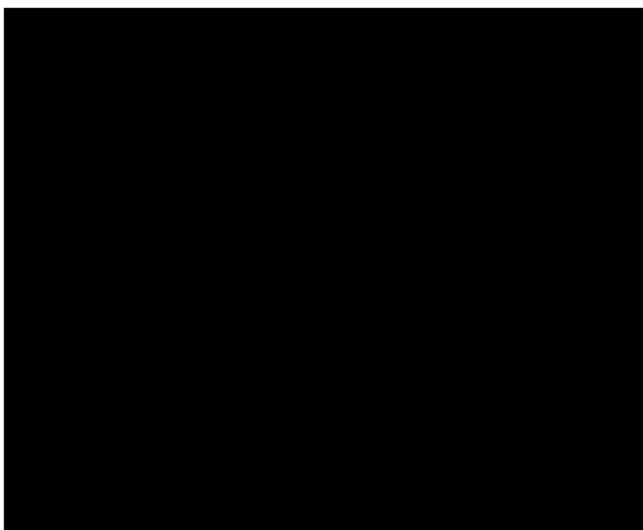


FIGURE 1. CT scan of the chest showing a right-sided pneumonectomy with mediastinal shift and a thickened pleura parietalis with calcifications.

who had pulmonary resections.² As most cases of postpneumonectomy BPF develop within days, weeks, or at the most, months of the operation, it should be noted that our case is an unusual late-presenting variant.³

In 1997, a 61-year-old man with a medical history of recurrent respiratory tract infection of the left lung was hospitalized because of malaise, weight loss and a massively productive cough. In 1990, he had undergone a right pneumonectomy because of squamous cell carcinoma of the upper lobe, with extension into the right main bronchus and postobstructive pneumonia (Stage IIIa, T₂N₂M₀). The postoperative recovery was uneventful. Subsequently, high-dose radiotherapy (56 Gy) was given for ipsilateral paratracheal lymph node metastases.

On admission, the patient was in poor clinical condition, although regular checkups had not demonstrated recurrence of the tumor. Physical examination revealed no abnormalities, apart from the right-sided pneumonectomy. Laboratory examination showed an ESR of 77 mm/h (n=0-15), Hb 7.6 mmol/L (n=8.7-11.2), Ht 0.40, MCV 88 fl, WBC count 12.3x10⁹/L (n=4.0-10.0), with normal differentiation, total serum protein 89 g/L (n=60-80), α -1 globulin 4.5 g/L (n=1.0-4.0), α -2 globulin 11.1 g/L (n=4.0-8.0), and gamma-globulin 17.0 g/L (normal 8.0-12.0). Creatinine, urea, electrolytes, glucose and liver function tests were normal.

Chest radiography showed minor alveolar infiltration of the left lower lobe, and homogenous filling of the pneumonectomy cavity without an air-fluid pattern. Bronchoscopy did not demonstrate disruption of the bronchial stump or abnormalities in the contralateral lung. CT scan of the chest showed a pneumonectomy cavity with a thickened pleura and calcifications (Figure 1). Microscopic examination of the sputum did not reveal malignant cells or alveolar macrophages. Therefore, sinus radiography, esophagography,

and CT scan of the neck were performed to exclude sinusitis, retropharyngeal abscess, Zenker-diverticula, gastroesophageal reflux, and esophagopleural fistula. Finally, transthoracic injection of 10 mL methylene blue into the pneumonectomy cavity resulted in discoloration of the sputum within a few hours, thus proving a BPF. In retrospect, the site of the BPF could not be visualized on CT scan.

The treatment consisted of surgical drainage of the cavity by a permanent open thoracostomy (Clagett procedure), parenteral broad spectrum antibiotics, and subsequent irrigation of the pneumonectomy cavity with povidone-iodine and later, sterile saline. Cultures from the pneumonectomy cavity revealed *Staphylococcus aureus* and *Streptococcus faecalis*. Eighteen months after the Clagett procedure, the patient's clinical condition remains excellent.

The incidence of postpneumonectomy BPF has decreased in recent years, but still varies around 3%.³ It is a life-threatening condition which carries mortality rates that can reach up to 50%, depending on the onset of presentation and the presence of empyema.⁴ Most deaths occur as a consequence of pneumonia, sepsis and ARDS.⁴ Reported risk factors for the development of postpneumonectomy BPF are listed in Table 1.³⁻⁵ Concomitant predisposing conditions include diabetes mellitus, hypoalbuminemia, hepatic cirrhosis, and steroid administration.⁴ In our patient, four risk factors were present: right-sided pneumonectomy, lymph node dissection, radiation therapy, and preoperative pulmonary infection.

Our patient presented with the warning symptoms of fever, malaise and an increasingly productive cough, which worsened in the left lateral position. Laboratory examinations showed signs of a chronic infection. Since conventional evidence in the form of a typical air-fluid level on chest radiographs was absent, and bronchoscopy repeatedly showed no obvious defects, causes other than BPF with empyema were initially suspected. Acutely presenting postoperative BPF is commonly diagnosed by fiberoptic bronchoscopy, especially if the fistula is large and centrally located.³ However, in patients with occult BPF it can be very difficult to localize the site of persistent air leakage.⁴ In these cases, sinography (injection of radiopaque material into the pleural cavity), bronchography, ventilation scintigraphy and computed tomography are reported to be useful adjuvant techniques to support the diagnosis.^{1,6,7}

In our case, the use of methylene blue proved to be a useful tool in the diagnosis of BPF after pneumonectomy. Although the instillation of methylene blue into any body cavity will result in discoloration of sputum, urine, and other secretions within 24 hours, rapid recovery of the dye from the sputum is highly suggestive of direct leakage across the bronchus stump. The question remains whether the fistula gave rise to the pleural empyema, or the pleural empyema discharged through the fistula.

Successful management of postpneumonectomy BPF

TABLE 1. Reported risk factors for the development of postpneumonectomy BPF.

Right-sided lung resection
Lymph node dissection
Radiation therapy
Preoperative pleuropulmonary infection
Long bronchial stump (2 cm or larger)
Stapled bronchial closure
Recurrent carcinoma
Prolonged postoperative mechanical ventilation
Pneumonectomy for chronic lung infections, e.g., tuberculosis

involves multiple steps. To limit endo bronchial contamination and prevent drowning, thorough drainage of the pleural cavity, either by closed-tube or open thoracostomy, is an essential first step, followed by daily irrigations.^{8,9} Excellent results can be obtained in most patients using the Clagett procedure and its modifications, in which resection of several ribs result in a permanent open thoracostomy.⁸ Infection of the contralateral lung should be vigorously treated with parenteral antibiotics guided by cultures of blood, sputum and empyema fluid. Only when these conditions are achieved and the nutritional status is optimized should definitive surgical repair of the fistula be considered. This may be achieved by suture closure alone, or in combination with aggressive transposition of vascularized flaps of omentum, muscle, pericardium or pleura.^{4,8,9} Patients who are poor operative candidates may be treated with endoscopically or transthoracically placed tissue glue (Histoacryl) to seal the fistula.^{9,10}

Johan M. van der Klooster, MD
Albert F. Grootendorst, MD, PhD
Jan W. Brouwers, MD
 Departments of Internal Medicine and
 Intensive Care Medicine
 St. Clara Ziekenhuis
 Olympiaweg 350
 3078 HT Rotterdam
 The Netherlands

References

1. Hsu JT, Bennett JM, Wolff E. Radiologic assessment of bronchopleural fistula with empyema. *Radiology* 1972;103:41-5.
2. Franz BJ, Murphy JD. Masked bronchopleural fistula. *J Thorac Surg* 1955;29:512-7.
3. Wright CD, Wain JC, Mathisen DJ, Grillo HC. Postpneumonectomy bronchopleural fistula after sutured bronchial closure: incidence, risk factors, and management. *J Thorac Cardiovasc Surg* 1996;112:1367-71.
4. Puskas JD, Mathisen DJ, Grillo HC, Wain JC, Wright CD, Moncure AC. Treatment strategies for bronchopleural fistula. *J Thorac Cardiovasc Surg* 1995;109:989-96.
5. Reed CE. Pneumonectomy for chronic infection: fraught with danger? *Ann Thorac Surg* 1995;59:408-11.
6. Westcott JL, Volpe JP. Peripheral bronchopleural fistula: CT evaluation in 20 patients with pneumonia, empyema, or postoperative air leak. *Radiol* 1995;196:175-81.
7. Nielsen KR, Blake LM, Mark JB, DeCampli W, McDougall IR. Localization of bronchopleural fistula using ventilation scintigraphy. *J Nucl Med* 1994;35:867-9.
8. Deschamps C, Pairolero PC, Allen MS, Trastek VF. Management of postpneumonectomy empyema and bronchopleural fistula. *Chest Surg Clin N Am* 1996;6:519-27.
9. Gall SA Jr, Wolfe WG. Management of microfistula following pulmonary resections. *Chest Surg Clin N Am* 1996;6:543-65.
10. Aasebo U. Thoracoscopic closure of distal bronchopleural fistulas, using tissue glue. *Eur Respir J* 1989;2:383-4.