Scope
Heart welcomes letters commenting on papers published in the journal in the previous six months. Topics not related to papers published earlier in the journal may be introduced as a letter: letters reporting original data may be sent for peer review.

Presentation
Letters should be:
• not more than 600 words and six references in length
• typed in double spacing (fax copies and paper copy only)
• signed by all authors
They may contain short tables or a small figure. Please send a copy of your letter on disk. Full instructions to authors appear in the July 1999 issue of Heart (page 116).

Management of scorpion sting
EDITO—We read with great interest the haemodynamic pattern in patients with scorpion envenomation.1 We have studied this acute time sensitive medical emergency since 1976 and have tried various regimens including antiscorpion venom.2 Since the advent of prazosin (1983–84)—an α-adrenergic blocker which acts as an antidote to venom—the mortality of scorpion sting victims is less than 1%.3

In the pre-prazosin era (1961–83) a fatality rate of 25–30% was reported from western India,4 acute pulmonary oedema causing death. We were therefore surprised by the 25% mortality reported by Karnad,5 and that two victims died on the third day of hospitalisation; we have similar findings in 1978–82—that is, before prazosin treatment.6

We have reported that the severity of scorpion sting depends on the victim’s age, the season, and the time between sting and administration of prazosin. The symptoms following the sting are hypotension, tachycardia, pulmonary oedema, and shock (autoimmune storm).7 We believe that the transport of Karnad’s patients to the nearest major hospital delayed their diagnosis, seven of eight had acute pulmonary oedema owing to a delay in reaching a tertiary care hospital.8 Scorpion venom inhibits angiotensin converting enzyme (ACE), resulting in accumulation of Bradykinin, which is implicated in the development of pulmonary oedema and acute reversible pancreatitis.9 Captopril (an ACE inhibitor) has a similar action resulting in hyotension resistant to dopamine agonists.10 Bradykinin further enhances noradrenaline (norepinephrine) release by a presynaptic mechanism.11

Alpha receptor stimulation plays a major role in the pathogenesis of pulmonary oedema.12 It causes hyperkalaemia and hyperglycaemia (inhibition of insulin secretions). Angiotensin II stimulates α adrenergic receptors in the myocardium and hypoxia results from coronary spasm as well as accumulation of free fatty acids and free radicals injurious to myocardium leading to cardiac arrhythmias and sudden death.13

At a general hospital at Mahad we successfully treated 658 cases of severe scorpion sting with oral rehydration, oral prazosin, and oxygen and umifenpyline: 362 (55%) had hypertension, 178 (27%) had pulmonary oedema, 118 (18%) had tachycardia; no patient had lethal arrhythmias. Seventeen patients who died on the way to Mahad had been referred 24 hours after being stung while 13 cases were admitted with multiorgan failure and were moribund and comatose; they died 30–60 minutes after admission despite treatment with dopamine, nitroprusside, oxygen and endotoxin glue drip. The remaining 56 cases with massive pulmonary oedema recovered after treatment with intravenous sodium nitroprusside.

We travelled throughout western Mahar-ashtra where Mesobuthus tamulus scorpion flourishes, and taught all peripheral doctors how to treat scorpion sting victims. There has not been any deaths over the past two years due to scorpion sting reported from this region. Moreover, only two patients had massive pulmonary oedema, which was treated with intravenous sodium nitroprusside. Captopril failed to correct haemodynamic abnormalities in two cases who had cardiac arrhythmias. In our region prazosin would have been life saving in the two patients treated with captopril who died in Karnad’s report.1 As a potent inhibitor of phosphodiesterase, prazosin causes accumulation of cGMP, a second messenger of nitric oxide, in vascular endothelium and myocardium, inhibits the formation of inositol triphosphate, and activates venum inhibited calcium dependent potassium channels.14

Thus prazosin reverses both inotropic (hypertention) and hypokinetic (pulmonary oedema, hypotension, tachycardia) phases evoked by scorpion envenoming.15

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2 Bawaskar HS, Bawaskar PH. Envenomation by scorpion Buthus tamulus: their neurotoxins and therapeutics. Trop Doct. [In press.]

EDITOR—The study by Karnad1 on the haemodynamic patterns encountered in scorpion envenomation raises important concerns. Karnad claims that the mechanism of pulmonary oedema observed in scorpion envenomation had not previously been established as pulmonary artery wedge pressure (PAWP) had not been measured. However, the haemodynamic mechanism of pulmonary oedema in scorpion envenomation was suggested in animal studies as early as 198016 and confirmed by numerous series in human subjects. All of these series performed a haemodynamic study and published the results. We are therefore not surprised with Karnad’s findings and observe that they are consistent with our previous reports suggesting similar effects of the Indian red scorpion Mesobuthus tamulus and the yellow scorpion of North Africa (Androctonus australis).

We are particularly concerned by Karnad’s interpretation of the haemodynamic records in the envenomated patients and the treatment strategy he suggests.17 The haemodynamic, echocardiographic, and angiographic studies have shown that severe scorpion envenomation impairs left and right ventricles to the same extent.18 Echocardiographic studies showed that LV systolic function might be deeply depressed with a mean LV fractional shortening as low as 12%.19 Regarding the right ventricle, in eight patients we recorded a mean RV ejection fraction of 24%.20 In fact, severe scorpion envenomation evokes acute heart failure which tends to recover in a few days. The heart failure might be concealed in some patients by the simultaneous hypovolaemia that occurs in envenomated patients as a consequence of vomiting and sweating. Hence, the patterns II, III, and IV described by Karnad should not be disregarded different from the multiple facets of the same and only haemodynamic feature that on the profile of acute heart failure (patterns II and IV) that might be mitigated by simultaneous hypovolaemia (pattern III). Moreover, the three reported patients who had simultaneous hypovolaemia exhibited a worsening in their pulmonary oedema with fluid infusion, suggesting an exaggerated increase in PAWP resulting from altered LV function.

Although attractive from a pathophysiological standpoint, Karnad challenges the usefulness of inotropic drugs and claims that they improve only transiently the circulatory failure observed in scorpion envenomation with no effect on mortality. We are unaware of any study specifically addressing this issue. Nevertheless, owing to the clearly established haemodynamic pattern of severe scorpion envenomation and on the basis of a pathophysiological approach, we believe that prazosin, a potent inhibitor of phosphodiesterase, or dobutamine, a selective β-adrenoceptor agonist, might improve the pulmonary oedema and the right ventricle’s function.15

Finally, Karnad suggests that RV failure occurs late in the terminal phase of scorpion envenomation and combines with pre-existing LV failure to produce severe cardiogenic shock. This speculation is not supported by Nouira et al who used a modified Swan–Ganz catheter equipped with a fast response thermodilution catheter. The study showed that scorpion envenomation evokes simultaneous impairment of both the LV as well as the RV, the latter being depressed to the same extent as the former. Infusion of dobutamine enhances RV as well as LV performance.20

In conclusion, scorpion envenomation kills thousands of patients in developing coun-
tries. First line clinicians need comprehensive and meaningful insights regarding the pathophysiology and valuable treatments of this dreaded accident. The clearer and simpler the message on this issue the better the effect in daily clinical practice.

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2 Gueron M, Adolph RJ, Grupp LL, et al. Hemo-
dynamic and myocardial consequence of scorpion venom. Am J Cardiol 1980;45:979–86.

These letters were shown to the author, who replies as follows:

The efforts of Bawaskar and Bawaskar in popularising prazosin treatment in western India are truly commendable, and the effect on mortality following scorpion envenomation is impressive. They cite their personal experience with 598 patients treated with prazosin, of whom only 30 (4.5%) died. They had previously reported 526 patients treated with prazosin, of whom only 20 (3.8%) died. It is surprising, therefore, that at this stage right ventricular function has been measured by echocardiography in only eight patients reported in my paper.

Our patients with pattern II showed severely raised PAWP and subnormal left ventricular stroke work index, while right ventricular stroke work index and right atrial pressures were normal, suggesting that the left ventricle was severely depressed and both PAWP and right atrial pressures were grossly raised suggesting that at this stage right ventricular function was also severely deranged.

Abroug et al mention that they have been using dobutamine in scorpion envenomation with good results. Their results also received antivenom, which is not available in India. It may be possible that antivenom favourably alters the response to inotropic catechol-
amines. The experience of Bawaskar and Bawaskar suggests that inotropic treatment given to patients who have not received antivenom does not decrease mortality. Al-
though no controlled studies exist, studies using historical controls treated convention-
ally, including inotropic drugs, have shown that vasodilators like prazosin, calcium channel blockers, ACE inhibitors and sodium nitroprusside have been used. However, whether any one of them is superior has not been studied. Currently available evidence indicates that these are equally effective and the suggestion that prazosin may have been effective in patients who did not improve with captopril as suggested by Bawaskar can only be consid-
ered speculative.

Abroug et al have, in a previous study, shown that left ventricular ejection fraction measured by echocardiography was severely depressed (26%) following scorpion envenomation. They showed a threefold improve-
m ent to 75% during recovery. In another study, they assessed right ventricular function using a pulmonary artery catheter; right ventricu-
lar ejection fraction was 24% following envenomation and improved to 39% during recovery. Unfortunately simultaneous right and left ventricular functions have not been studied.

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ered speculative.

BNP and its prohormone derivative (N-
terminal proBNP) offer exciting prospects for non-invasive assessment of myocardial func-
tion and outcome following infarction. Rich-
ards et al have clearly demonstrated the prog-
nostic superiority of BNP over other neurohormonal markers that supporting their initial hypothesis. Their concluding statement, however, suggests that plasma BNP “could reasonably be included in the routine clinical workup of a patient following myocardial infarction” seems premature.
severity of cardiac injury across the entire mild to very severe. In contrast, plasma BNP of infarction creates crude categories, which patients according to inferior or anterior site ure. This is not surprising as division of recently published paper, plasma BNP re-multivariate analysis of data reported in our ing points. First, when the site of myocardial Dr Khan’s letter raises a number of interest-

This letter was shown to the authors, who reply as

The statement by Dr Khan “The time course of BNP shows a peak at 16 hours fol-

the area under a receiver operator characteris-


2 Richards AM, Nicholls MG, Yandle TG, et al. Plasma N-terminal pro-brain natriuretic pepti-


3 Yu CM, Sanderson JE, Shim IOL, et al. Diasto-

lic dysfunction and natural course of systolic heart failure. Higher ANP and BNP levels are associated with a more rapid decline in LVEF, but the exact relationship is difficult to ascertain. Eur Heart J 1996;17:1064–702.


6 Nakayama M, Naka K, Obara K, et al. Augmented secretion of brain natriuretic pep-


8 Foy SG, Crozier IG, Richards AM, et al. Neuro-


1 Richards AM, Nicholls MG, Yandle TG, et al. Neuroendocrine prediction of left ventricular


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6 Nakayama M, Naka K, Obara K, et al. Augmented secretion of brain natriuretic pep-


8 Foy SG, Crozier IG, Richards AM, et al. Neuro-

cardiopulmonary bypass may all cause a degree of immune dysfunction. If the donor’s blood happens to be homozygous for one of the recipient’s major HLA types, this transient immune dysfunction may facilitate donor’s lymphocyte engraftment and development of TA-GVHD.

We emphasise the relation of this highly dangerous condition with cardiopulmonary bypass surgery. One can only speculate as to the nature of this association.

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This letter was shown to the authors, who reply as follows:

Ghrew et al report a patient with TA-GVHD following elective four-vessel CABG and perioperative transfusion of six units of blood. It would be interesting to know in this case about the freshness of the transfused blood and whether shared haplotypes between the donor(s) and recipient was a feature in addition to the transient immunomodulatory effect of cardiopulmonary bypass.

The Oxford report re-emphasises that TA-GVHD as a complication of cardiopulmonary bypass surgery is seen in Europe. The association was first made in Japan, where the reported frequency of one way matching or sharing HLA haplotype in a non-first degree relative ranges from 1:312 to 1:256.

First the transfused units may contain an insufficient number of immunocompetent lymphocytes; second, some recipients may be able to destroy the donor lymphocytes on the basis of subtype differences in the class I or other minor histocompatibility antigens between the donor and recipient. Finally, it is possible, and quite likely, that some cases have remained unrecognised and unreported.

We hope that our publication in Heart of two cases of TA-GVHD after cardiac surgery will heighten awareness of this complication of transfusion, and result in full investigation and reporting of all suspected cases to SHOT (serious hazards of transfusion). It is necessary to establish the true incidence of TA-GVHD in cardiac surgery so that cost-benefit analysis and informed review of guidelines on the irradiation of cellular blood products for this indication can be completed.


Outpatient clinics for adults with congenital heart disease

EDITOR,—We agree with the views expressed by Gatzoulis et al concerning the need for dedicated clinics for adults with congenital heart disease. We started such a clinic in 1993. Initially this was once a month, becoming semimonthly in 1995 and weekly in 1999. The clinic is in a district general hospital serving a population of 650 000, and the initial numbers may have been present because of the early work of Bill Oliver in establishing catheter facilities on this site and the link with Great Ormond Street visiting cardiologists. One of us also runs a paediatric clinic and the other has experience in adult congenital heart disease.

Forty three per cent of our 260 patients are male, and 25% of the patients have septal defects (both atrial and ventricular). As these are uncomplicated, closed defects are not followed up all these patients have additional lesions or residual sequelae of the original repair.

- 12% have had a tetralogy of Fallot repaired
- 11.5% have bicuspid aortic valves
- 8.7% have had a coarctation repaired
- 11% have cyanotic heart disease (5% with the Eisenmenger deformity)
- 5% have left ventricular outflow tract abnormalities
- 5% have transposition of the great arteries—all of whom have had the Mustard repair
- 12.1% of patients have Marfan’s syndrome (although patients with Marfan’s are also seen in general clinics).

The remaining 9.9% have various condition from complex congenital heart disease including tricuspid atresia with Fontan operation (1.3%), single ventricle with total cavopulmonary connection (TCPC) (1%), complex pulmonary atresia with right ventricular outflow tract reconstruction (2.6%), septated double outlet ventricles (2.6%) to abnormal AV valves (mitral clefts and Ebstein’s anomaly) (2.1%), corrected transpositions pulmonary valve and pulmonary branch stenoses.

- 33.6% have had no previous interventions
- 58.5% have had a single surgical repair of which 10.9% have had one or more reoperations
- 7.9% have had palliative procedures only.

There have been a few patients with complex cyanotic heart disease who we have referred for their first operative intervention in their 20s, including TCPC in a patient with single ventricle, and right ventricular outflow tract reconstruction in a patient with complex pulmonary atresia.

- 2.1% have had catheter interventions such as dilatation of aortopulmonary collaterals, coil obliteration of residual shunts, etc
- 2.1% have had pacemaker implantations.

One patient has already been transplanted (atrial septal defect and restrictive cardiomyopathy), three are waiting (two heart–lung and one heart transplant), and one died on the waiting list.

We use transoesophageal echocardiography and magnetic resonance imaging in selected patients in addition to the more routine use of echocardiography, ECGs, Holter monitoring, and exercise testing. Very complicated cases are usually sent to a tertiary centre for catheterisation, with whom we have a close liaison; indeed in some cases the patient care is shared and discussion of difficult problems in other cases is helpful. The patients do seem to value a dedicated clinic in their local hospital, particularly when given the time to discuss contraception, employment, insurance, housing, inheritance, and pregnancy.

New patients transferred from the paediatric service are also introduced to the GUCH (grown up congenital heart) association, which has newsletters, helplines, and area meetings. We try to maintain an emergency slot for patients if they become worried about symptoms. “At risk” pregnancies are also supervised within the clinic, with close liaison with obstetricians and anaesthetists. Fetal echocardiography is performed at 20 weeks. We would concur with Gatzoulis et al that structured transitional requirements for these patients must be introduced so that they are not lost to follow up when the leave the paediatric service and, as we hope we have shown, a dedicated clinic within a region does fulfil a need, a point purchasers may care to note.

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