Extradural Haematoma in Football

The Editor,

Sir,

Extradural haematoma is a collection of blood between the inner table of the skull and the outer layer of dura mater. The main aetiologies are road traffic accident, fall and assault. It is rare in football. The most common playing action that causes head trauma is heading duel (1). We present the case of a 22-year old student who presented unconscious six hours after a heading duel in a football match. He fell down and lost consciousness. He regained consciousness after some minutes. A few hours later, he started having headache then became drowsy and lost consciousness.

He had a small scalp swelling on the left fronto-temporal area. His Glasgow Coma Score was 8/15. He had anisocoria with left pupil 6 mm and right 3 mm and both pupils reacted sluggishly to light. There was right facial nerve palsy (upper motor), right hemiparesis with associated hypertonia and hyperreflexia. Clinical diagnosis of extradural haematoma was made and confirmed by computed tomography (CT) scan (Fig. 1) done three days after the incident. He had craniotomy (Fig. 2), and there was linear skull fracture over the haematoma. He did well and was discharged 13 days after surgery. There was no neurological deficit two months after the surgery.

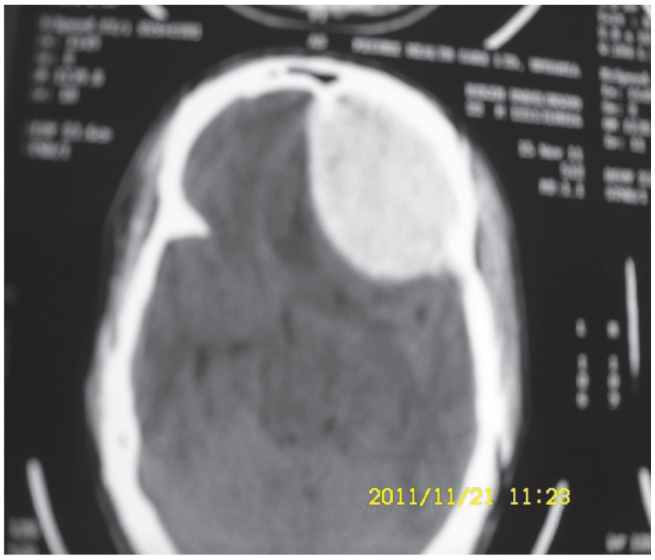

Fig. 1: Brain computed tomography scan showing left frontal extradural haematoma.

Fig. 2: Intraoperative photograph showing the haematoma being evacuated.

Extradural haematoma constitutes 0.5% of all head injured patients (2) and sports injuries constitute 2.7% of head injuries (3), thus showing rarity of extradural haematoma in sports. Bruzzone *et al* (4) reported a case of a 19-year old footballer who hit his fronto-parietal region against the left frontal scalp of his opponent. He fell down and lost consciousness for 20–30 minutes. Computed tomography scan done eight hours after the incident revealed right frontal extradural haematoma. He had emergency craniotomy and was discharged on the 10th day with no neurological deficit. The index patient travelled 170 km to do the CT scan because there was none in our city, causing delay in his treatment. His complete recovery gives credence to the outcome in patients with extradural haematoma associated with skull fracture in which the fracture serves as vent (5).

Extradural haematoma in football should be suspected when there is loss of consciousness with lucid interval arising from heading duel. Football authorities should take into consideration the available medical facilities when planning to locate football stadiums.

Keywords: Computed tomography, extradural haematoma, head trauma

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The Significance of Evaluating the Variation of Mechanical Microstructure for Hypertrophic Cardiomyopathy Using Diffusion Tensor Magnetic Resonance Imaging

The Editor,

Sir,

Hypertrophic cardiomyopathy (HCM) is a genetic and familial cardiovascular disease which can cause severe arrhythmia and heart failure. With irregular hypertrophy and disorganized arrangement of cardiomyocytes on histological picture, the normal myocardium macrostructure appears in whole or part as ventricular wall thickness, especially ventricular septal thickness (1).

The variation of myocardial microstructures is associated with a range of clinical outcomes. However, common examinations such as echocardiography and delayed enhancement magnetic resonance (DE-MR) can only diagnose HCM after cardiac dysfunction and macro structural changes. Although histology is the gold standard for HCM, it is unable to quantify changes and display 3D spatial structure. Therefore, highly sensitive and ultra-early examination techniques are in urgent need for the diagnosis of HCM.

Based on anisotropy of water molecules movement in different tissues, diffusion tensor imaging (DTI) can be used to quantify the diffusion characterization of internal water molecules in tissues (2). In the clinical setting, DTI is widely used in tractography of the central nervous system.

Intrinsically, DTI is a multi-parametric method to quantify myocardial fibres by means of multiple aspects, such as orientations using primary eigenvector, mechanical function using helix angle (HA) and transmural angle (TA), diffusion characteristic using fractional anisotropy (FA) and apparent diffusion coefficient (ADC).

Recently, DTI has been applied to trace myocardial fibre of animal heart *in vitro*. Healy *et al* found that the range of helix angle and transmural angle through the left ventricle was significantly different among species (3). Their results proved the sensitivity of DTI to explore variation of microstructures in myocardial fibres and laid the foundation for further studies.

Despite great challenges of DTI for *in vivo* heart due to cardiac motion, Toussaint *et al* successfully reconstructed the architecture of myocardial fibre in healthy volunteers *in vivo* (4). Wei *et al* also developed a multi-modal approach to assess the effects of cardiac motion on the human heart by diffusion tensor parameters. Their research is impressive and encouraging for improving imaging methods and evaluating myocardial fibres *in vivo* (5).

We propose that DTI is a sensitive method to diagnose the micro alternations of myocardial fibre in hypertrophic cardiomyopathy before occurrence of severe clinical symptoms or cardiac dysfunction in non-invasive and quantitative measurement. Three-dimension myocardial fibre architecture and corresponding quantitative parameters of patients will be revealed by DTI for *in vivo* heart in the very near future. This technique enables dynamic observation of patients and long-term follow-up to detect lesions promptly. Combining mechanical method with molecular imaging, DTI has excellent ability to solve clinical problems and achieve translational medicine.

Diffusion tensor imaging, an essential examination method, will have extensive application in clinical diagnosis to benefit more patients with HCM in future.

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Keywords: Diffusion tensor imaging, hypertrophic cardiomyopathy

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