Blunt major trauma: now two different diseases?

Major trauma in the UK has changed and can now be thought of as two different diseases: the traditional type of high energy transfer major trauma occurring in younger patients, and low energy transfer major trauma (usually an older person falling on one level). The current NHS trauma system is not well set up to treat low energy transfer major trauma – adapting to the changing disease is the next big challenge.

Introduction

Major trauma in the UK has changed. The national clinical audit for major trauma (the Trauma Audit and Research Network – TARN) has collected data (excluding those on fragility hip fractures) from all hospitals in England and Wales for the past 30 years (Coats et al, 2009). Until 2018, the typical major trauma patient had always been a young man who had been injured in a road traffic collision (or via another high energy transfer mechanism of injury). However, with an ageing population there has been a gradual change (TARN, 2017), and since 2018, the typical major trauma patient (about 52% of the total) has been elderly, female and injured by a fall on one level (a low energy transfer mechanism of injury). Using the standard Injury Severity Score (Baker et al, 1974), the anatomical injuries caused by high energy and low energy transfer major trauma are of equivalent severity, but they have different patterns, and the care pathways that patients follow are very different. This has led to debate about whether there are two different underlying diseases and whether different types of major trauma require different treatment systems.

The predominant patterns of injury after low energy transfer major trauma involve injury to the head and chest wall, often in combination with limb fractures. There is relatively little internal organ damage, massive haemorrhage or vascular disruption, and thus a lower requirement for surgical intervention. The requirement for specialist interventions, such as surgery or critical care, is also decreased as palliation is usually the most appropriate approach for older patients with the most severe injuries, because of the low chances of recovery.

Care pathways are different for low energy transfer trauma because it is 'stealth trauma' (Davies and Coats, 2019). These severely injured patients do not have the drama of a car crash scene to highlight the possibility of severe injury as they have 'only' fallen over. In addition, cardiac drugs and ageing autonomic systems mean that they do not have the typical physiological disturbance of severe injury so, at initial presentation, these major trauma patients look just the same as the thousands of older people who are brought to hospital each day with minor injury after falling. This means that low energy transfer major trauma is difficult to immediately identify. Clinical teams often do not recognise the presence of major trauma until relatively late in the emergency department phase or, in a significant proportion of cases, on a medical or geriatric ward. This lack of early identification has a number of consequences – no trauma team alert, treatment by more junior staff, delays to investigations and delays to treatment (TARN, 2017). Treatment planning is also delayed and often disorganised (multiple phone calls to remote specialists rather than a trauma team attendance).

In 2012, trauma care in the NHS was reorganised, creating a system based on early identification and prehospital triage of patients by ambulance crews direct to a specialist major trauma centre (Davenport et al, 2009). This large organisational change was extremely successful, giving a 19% decrease in the chances of dying (Moran et al, 2018). The system works for high energy transfer major trauma, but the stealthy presentation of low energy transfer major trauma does not give any opportunity for early recognition by ambulance crews and triage direct to a major trauma centre, meaning that low energy major trauma is still a disease presenting mainly to trauma units.

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Is low energy transfer major trauma a separate disease?

In disease classification, there are key characteristics that define a disease. In major trauma, as well as a different aetiology (low vs high energy transfer), there are differences in biology (anatomical pattern of injury and physiological response to injury), presentation (symptoms and signs are different and often much more subtle), natural history (delayed development of symptoms, especially in head injury), treatment required (supportive and multidisciplinary rather than interventional or surgical) and outcomes (higher mortality). Low energy transfer major trauma is different from traditional major trauma in all of these key characteristics, so it should be considered a different disease.

The data story

Maybe the concept of two diseases in major trauma should not be a surprise, as we have known for many years that major trauma in older people is different. The original application of a major trauma audit in the 1980s (Champion et al, 1990) needed two different mathematical models to predict outcome, dividing major trauma patients into younger and older groups. The requirement for a younger/older split in the trauma model was always assumed to be simply a function of age (old people have worse outcomes). However, the data from TARN suggest that this has been misinterpreted for 30 years. It is not simply age that makes the difference, there is in fact a different disease. Realising this is a crucial change in our mindset.

Implications

Changing to a two-disease model of major trauma (or three-disease if penetrating trauma is included) is likely to be important for the future of trauma care in an ageing population. There are implications for the way we approach research, audit and clinical care.

The implication for future trauma care research is that studies will need to be stratified by mechanism of injury, as the increased heterogeneity created by combining low and high energy transfer patients into one group is likely to conceal the effects of a treatment that is effective in one group (increased chance of type 2 error).

The implication for future trauma care audit is that as evidence about best care for each group becomes available, we should be thinking about whether it is right to continue the current systems, which have the same set of performance standards and outcome measures for both high and low energy transfer major trauma.

The implication for development of future trauma care systems is that the current single 'one size fits all' trauma system for the UK may not be the most appropriate and may need to change as the disease is changing.

Future treatment systems for low energy transfer major trauma

Patients with low energy transfer major trauma have little requirement for surgical intervention, but a high requirement for care planning with excellent supportive care, chest physiotherapy, multidisciplinary geriatric team input with rehabilitation services, and defined ceilings of care. There is little evidence about the effect of different care systems on outcomes following low energy transfer major trauma, but from orthopaedics there is good evidence of benefit from early multidisciplinary orthogeriatric input (National Institute for Health and Care Excellence, 2017) and it is likely that the same approach is required in patients with low energy transfer major trauma.

Major trauma centre or trauma unit care for low energy transfer major trauma?

The initial care planning for low energy transfer patients needs input from major trauma centre trauma team specialists to give early clarity for both care teams and relatives about the need for intervention, whether an active or palliative approach should be taken, and the ceiling of

Key points

- Major trauma in the UK has changed, with low energy transfer mechanisms now predominating.
- Major trauma after a low energy mechanism of injury is difficult to identify.
- Considering major trauma as two different diseases has important implications for future research, audit and clinical systems.
- Organisation of major trauma care within the NHS may need to be changed to fit with the changing nature of the disease.

care. However, as few patients need intervention there is no absolute requirement to move the patient to the major trauma centre if this input can be given remotely. As ongoing care is usually non-interventional (eg chest physiotherapy, early mobilisation, optimisation of comorbidities and rehabilitation) this could be provided in a specialist trauma geriatric ward in a trauma unit (with regular remote review and support from major trauma centre trauma specialists).

As the care required by low energy transfer major trauma patients could be given within a trauma unit, is the standard 'major trauma should be transferred to a major trauma centre' still appropriate for all of these patients? TARN data show that in fact non-transfer is already normal practice, as the majority of older patients with major trauma are not being transferred to a major trauma centre (TARN, 2017). The next challenge for trauma networks in the UK is to develop the skills, organisation, communication and facilities to optimise trauma unit management of the newly recognised disease of low energy transfer major trauma.

Conclusions

Major trauma has changed in the developed world as a result of a safer society and an ageing population. Current trauma care systems have evolved to treat high energy transfer trauma (and penetrating trauma) by concentrating the patients in major trauma centres. However, this type of major trauma is now a minority. A recognition that blunt major trauma is now two separate diseases is the first step to developing future trauma treatment systems appropriate for our changing population.

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