Rapid fracture healing in a patient with inherited prion disease

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ABSTRACT

There do not appear to be any reports or guidelines in the published literature regarding the outcomes of operative or conservative management of fractures in patients with known prion disease. This case report may be helpful in the clinical management of fractures in such patients.

KEYWORDS

Fracture healing – Inherited prion disease – Transmissible spongiform encephalopathies

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Prion diseases (also known as transmissible spongiform encephalopathies) are a group of progressive neurodegenerative conditions affecting humans and animals. Patients with prion disease present a challenge when it comes to invasive procedures due to the risk of iatrogenic transmission, and these concerns have been recently highlighted.¹ This article presents a patient with inherited prion disease who sustained

fractures which were successfully managed conservatively with unusual results.

Case report

A 28-year-old woman with known inherited prion disease presented to accident and emergency following a road traffic accident. She sustained fractures of her right proximal humerus and right proximal tibia. There were no life-threatening injuries, and all other systems were unremarkable. She was stable on admission to the orthopaedic ward.

Further management of these fractures posed several difficulties. Under normal circumstances, both fractures would be treated by way of internal fixation. Although the patient was in good physical health, she had severe cognitive impairment due to prion disease, and was unable to give informed consent. Second the risk of iatrogenic transmission of prion disease by any form of invasive surgery needed to be taken into account.

After careful consideration, a decision was made to treat her non-operatively. Her arm was placed in a sling, and the fracture of the tibia was manipulated into a more acceptable position, and then placed in a long leg plaster cast. Serial radiographs demonstrated rapid fracture healing, with unexpectedly prolific callus formation at 3 weeks, especially in the humerus (Figs 1 and 2A,B). By 6 weeks, the humeral fracture had united and she had a painless range of shoulder movement. The tibial fracture appeared to have united by 8 weeks, but we retained the plaster for a further 2 weeks due to lack of reliability on the patient's part. At 10 weeks, she was able to weight-bear out of plaster without difficulty. This outcome is not normally seen with multiple fractures. She went on to make an excellent functional recovery.

Figure 1 Radiograph of fracture of proximal humerus at 3 weeks.

Figure 2 (A,B) Radiographs of fracture of proximal tibia at 3 weeks.

Discussion

The risk of iatrogenic transmission through invasive medical or surgical measures is well documented and, to date, about 267 cases of iatrogenic prion disease have been described.² The risk of transmission depends on both the type of procedure and the type of tissue involved, with brain, spinal cord and eye having the highest risk. For orthopaedic surgery, the risk of transmission is thought to be lower.³ Guidelines do exist regarding the decontamination and sterilisation of instruments.⁴

The inherited forms account for about 15% of human prion disease, and are transmitted in an autosomal dominant pattern with variable penetrance.⁵ The remainder arise in a sporadic manner, or are acquired. Our patient had an inherited prion disease caused by an insertional mutation (6 octapeptide repeat insertion mutation). She had severe cognitive impairment and short-term memory problems, scoring 11/30 on the mini-mental state examination. She also had expressive and receptive language dysfunction, and exhibited anti-social behaviour and disinhibition. Neurologically, she had a mild ataxia, brisk reflexes, clonus and extensor plantars. Her overall capacity to make any decision about her own care was very limited.

The fractures of her arm and leg were not life-threatening. The ideal treatment would normally be internal fixation of both fractures, as outcome in terms of fracture healing and return to function is better. As is sometimes the case in orthopaedic surgery, fractures are managed conservatively when other factors intervene; in this case, the patient's inability to consent for non-essential surgery, and concerns regarding iatrogenic transmission of prion disease supervened.

Accelerated fracture healing has been observed in certain traumatic situations, most notably in patients with head injury.⁵ Various mechanisms have been hypothesised in this situation. It is known that central mechanisms exist in the control of fracture

healing, and in the setting of head injury there may be a combination of neural, metabolic or biochemical factors that may stimulate increased callus formation. Local growth factors, inflammatory cytokines and endogenous bone morphogenic proteins have all been implicated.⁵ Similar factors may be responsible in prion disease, as it is possible that neural factors may exist which are common to both traumatic brain injury and brain injury due to prion protein. Histological analysis of the callus, something which was not possible with our patient, may yield valuable information if the opportunity arises in the future.

Conclusions

There do not appear to be any reports or guidelines in the published literature regarding the outcomes of operative or conservative management of fractures in patients with known prion disease. Although further work is required in the field to increase understanding of the mechanisms involved, we hope that this case report may be helpful in the clinical management of fractures in patients with prion disease.

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