The diamond frame: a simple and reliable construct for damage control resuscitation for femoral and knee spanning external fixation

I Pallister, A Tong, N Vannet, S Atherton

Abertawe Bro Morgannwg University Health Board, UK

CORRESPONDENCE TO

Ian Pallister, E: ian.pallister@wales.nhs.uk

BACKGROUND

Emergency external fixation conveys the benefits of fracture stabilisation without the risks of major surgery in damage control resuscitation.¹ Swiftly assembled, simple, reliable constructs are paramount, especially in mass casualty situations² and for trainees given limited exposure to this situation.³

TECHNIQUE

Diamond frames are characterised by the application of parallel handlebars to control each side of the injury. For femoral fractures, the handlebars are at 45° to the axis of the femur. In spanning frames, handlebars are applied parallel to the femur and tibia. These bars must be long with significant overlap so that they may then be connected by a second pair of bars, thus creating a diamond.

Figure 1 Femoral shaft fracture in a polytrauma patient. 'Sounding' the femoral cortex using straight scissors to assure perpendicular pin placement. Final reduction achieved. Final diamond frame, showing pin placement in relation to muscle groups, handlebars, connecting bars and the synovial reflection of the knee (dotted line).

Near-far pin placement is used, drilling in 5mm self-drilling/tapping Schanz pins through the near cortex, then bracing by hand against the far cortex (lateral and anterolateral pins in femoral frames and anterolateral femoral pins with anteromedial tibial pins in spanning frames). Both the zone of injury and the synovial reflections of the knee must be avoided. This can be done by screening at the zone of injury using a C-arm and by inserting the distal femoral pin proximal to mid-patella level laterally or at least two fingerbreadths proximal to the upper pole for an anterolateral pin. The injury is reduced

Figure 2 Severe tibial plateau fracture: admission x-rays and computed tomography reconstructions of temporary reduction achieved. Final diamond frame, showing pin placement in relation to muscle groups, handlebars, connecting bars and the synovial reflection of the knee (dotted line).

with axial traction and manipulation of the fracture/knee injury using the handlebars. The C-arm is used to confirm the adequacy of reduction along with tactile feedback.

DISCUSSION

These stable diamond frames can be constructed with speed and minimal C-arm screening.

References

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Rectus sheath catheterisation: a novel method of placement

Bagenal J, Horsnell J, Loader J, West D

Weston Area Health NHS Trust, UK

CORRESPONDENCE TO

Jessamy Bagenal, E: jessamy.bagenal@gmail.com

BACKGROUND

The benefits of good postoperative pain relief are well established and are fundamental to enhanced recovery programmes.¹ This new method of inserting a rectus sheath catheter is quick and easy to perform at operation.