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Editorial

# Reconstruction of pelvic ring and acetabular fractures: What lies ahead?

In the 1960s, pioneers of pelvic and hip fracture reconstruction conducted meticulous studies aimed at developing detailed descriptions and accurate classifications of fractures involving the pelvic ring and acetabulum. Their findings were and remain the prerequisite for establishing the fundamental principles of reconstruction techniques that durably restore both load transmission from the spine to the lower limbs and motion at the lumbar-pelvic-femoral junctions [1].

Major diagnostic advances have been provided by the routine use of 3D computed tomography, with both multiplanar reformation and 3D reconstruction. Digital tools are now available to assist surgeons in applying the classification to map the lesions in each individual patient, thereby guiding treatment decisions [2]. Image processing and semi-automated segmentation of the main bone fragments help to understand the lesions [3]. Although the new imaging tools are highly accurate, an extremely rigorous analysis requiring considerable experience must be performed.

Selecting the optimal fracture reduction and fixation technique should be left in the hands of experts highly proficient in performing the anterior and posterior approaches. A key step consists in predicting the ability of a given approach to allow successful controlled reduction [4,5]. Pre-operative simulation is therefore an important component of the planning process. Virtual models allow fragment repositioning with application of the forceps that will be needed during the procedure [6]. Pre-operative 3D printing of the pelvis allows anticipation of the devices that will be needed to achieve fixation in a manner suitable for the topographic configuration of the fracture and morphology of the individual patient [7]. Reduction of the different aspects of the pelvic ring must be obtained to prevent chronic pain [8]. In particular, the sacral slope in bipedal stance may be altered in patients with unstable fractures of the posterior pelvic ring [8–10] and restoration of the native pelvic incidence is a key concern for surgeons aware of the importance of spinal alignment [11,12]. The risk of peri-operative neurological and vascular injury must be routinely assessed [13,14].

During the procedure, 3D navigation is mandatory to determine and monitor the transcutaneous trajectories. A valuable contribution of 3D navigation is minimisation of the risk of injury to major vascular, neurological, and digestive structures [15–21]. Intra-operative 3D computed tomography is being increasingly used to check the quality of articular fracture reduction and of any complex procedures performed within the pelvic ring [15]. This method provides greater control over osteo-chondral fragment reduction. Intra-operative 3D imaging also gives assurance that joint surfaces have been accurately rebuilt [19].

Recent epidemiological work indicates that the number of pelvic ring and acetabular fractures is stable in young individuals but has been increasing in people over 60 years of age. Outcome studies have been performed to develop recommendations about identifying the best treatment and avoiding pitfalls in each type of pelvic ring and acetabular injuries [22–24]. Immediate or delayed arthroplasty may be the best reconstruction option [25–27], notably in older individuals and in patients with severe joint disruption or structural pelvic-ring injuries [28,29].

The brisk pace of publications in *Orthopaedics & Traumatology: Surgery & Research*, to which the reference list below bears witness, reflects the current progress towards greater diagnostic accuracy, more widespread use of procedure simulation and intra-operative 3D computer-assisted methods, and an accumulation of outcomes data to validate the indications.

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