Treatment and outcomes of pelvic malunions and nonunions: a systematic review
Kanakaris NK, Angoules AG, Nikolaou VS, Kontakis G, Giannoudis PV

CRD summary
This review assessed the effectiveness of treatment of pelvic malunion and nonunion in terms of overall union rates, pain relief, patient satisfaction and return to pre-injury level of activities. The authors concluded that treatment of pelvic malunion and nonunion appeared effective in most cases, but there were some perioperative complications. These conclusions seem reasonable.

Authors' objectives
To analyse factors that predispose a pelvic injury to develop a malunion or nonunion, clinical manifestation of pelvic malunion and nonunion and the efficacy of treatment alternatives and their outcomes.

Searching
MEDLINE and EMBASE were searched from inception to November 2008. Search terms were reported. Reference lists of retrieved papers were reviewed.

Study selection
Clinical studies (case reports included) that examined treatment outcomes in patients with malunion and nonunion of pelvic fractures and described the treatment method of these complications and outcome of treatment were eligible for inclusion. Only papers published in English or German were included. Congress proceedings, manuscripts with incomplete documentation of the deformity and unpublished studies were excluded.

Outcomes of interest were: overall union rates; pain relief; patient satisfaction; return to pre-injury level of activities; and treatment complications.

Two reviewers independently applied the inclusion criteria. There were no disagreements.

Assessment of study quality
Two reviewers independently assessed the quality of included trials and classified the level of evidence. No details of the quality components and how each component was assessed were reported. The authors did not report how disagreements were resolved.

Data extraction
Two reviewers independently extracted data on early and late postoperative complications and functional results. There were no disagreements between the reviewers.

Methods of synthesis
Studies were combined in a narrative synthesis.

Results of the review
Twenty-five studies (n=437) met the inclusion criteria: 10 case series and 15 case reports. All the studies were classified as level IV evidence.

Malunion was recorded in 133 patients and nonunion in 193 patients. Overall, 341 (79%) of patients with pelvic girdle malunion and nonunion were treated initially either nonoperatively or just by external fixation systems. The combination of open reduction-internal fixation and bone grafting was the method most frequently used for treatment of pelvic malunion and nonunion, and reported in 288 patients (67%). The average operative time was 6.1 hours (six studies, n=106). Twenty-one studies (n=396) reported an average time of 26 months (10 weeks to 15 years) between initial injury and surgical treatment.

Treatment of complications associated with malunion and nonunion appeared effective in most cases: overall union
rates averaged 86%; pain relief as much as 93%; patient satisfaction 79%; and return to a pre-injury level of activities 56%.

Incidence of perioperative complications was recorded: neurologic injury (5.3%); symptomatic vein thrombosis (5.0%); pulmonary embolism (1.9%); and deep wound infection (1.6%). The average amount of intraoperative blood loss was 1,193mL (range 12mL to 7,200mL). Implant loosening and breakage occurred in only 13 cases (3.1%). Twenty-five patients (6.0%) required one to three reoperations before a satisfactory final result was achieved. Intraoperative bladder injuries occurred in 0.8% of cases. Vascular injuries occurred in 0.5% of cases. Overall recovery rate of patients varied from very good (79%) to poor (15%).

Authors’ conclusions
Treatment of pelvic malunion and nonunion appeared effective in most cases, but the patient should be informed about the incidence of perioperative complications.

CRD commentary
This review addressed a well-defined question in terms of participants, interventions, outcomes and study design. The search included appropriate electronic databases, but no attempts were made to retrieve unpublished studies and some relevant data might have been missed. Two reviewers independently selected studies, extracted data and assessed the quality of the included trials to minimise bias and errors during the review process. The characteristics of the individual trials were presented. The authors stated that validity of the included studies was assessed, but did not report how each quality component was assessed. The authors’ conclusions seem reasonable even though they were based on poor-quality evidence.

Implications of the review for practice and research
Practice: The authors stated that a thorough preoperative plan and methodical operative intervention was essential for a successful treatment outcome of pelvic malunion or nonunion. The introduction of multicentre networks of pelvic trauma management was necessary in establishing effective evidence-based clinical practice.

Research: The authors did not state any specific implications for research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.