

Supplementary file 2: Studies excluded at second screening with reason for exclusion

Reference	Reason for exclusion
Lau TW, Leung F. Occult posterior pelvic ring fractures in elderly patients with osteoporotic pubic rami fractures. <i>Journal of Orthopaedic Surgery</i> . 2010;18(2):153-7.	Intervention (no LC1's had fixation)
Bohme J, Hoch A, Josten C. Osteoporotic fractures of the pelvis Osteoporotische Frakturen des Beckens. <i>Chirurg</i> . 2012;83(10):875-81.	Language
Caban A. External fixation in the treatment of pelvic fractures. <i>Ortopedia Traumatologia Rehabilitacja</i> . 1999;1(1):49-59.	Language
Chen LH, Shih CH, Hsu WW, Chen WJ, Wu CC, Su JY, et al. Anterior internal fixation of the disrupted sacroiliac joint: A preliminary report. <i>Journal of Surgical Association Republic of China</i> . 1993;26(3):1796-804.	Language
Pavelka T, Salasek M, Weisova D. [Complications associated with surgical treatment of pelvic ring fractures]. <i>Acta Chirurgiae Orthopaedicae et Traumatologiae Cechoslovaca</i> . 2013;80(3):208-15.	Language
Zhang J, Wu K, Zhang W, Wu W, Hou S. [Percutaneous fixation of pelvic fracture by acutrak full thread headless hollow compression screw]. <i>Chinese journal of reparative and reconstructive surgery</i> . 2012;26(1):91-6.	Language
[No authors listed]. Managing pelvic fractures. <i>Nursing</i> . 2003;33(12):43.	Not research
[No authors listed]. SESAP critiques / critiques SESAP. <i>Canadian Journal of Surgery</i> . 1997;40(6):420.	Not research
Baird R. Open reduction of pelvic fractures. <i>Western Journal of Medicine</i> . 1991;155(2):171.	Not research
Bauer J, Holzl A, Verheyden A. The operative treatment of sacral insufficiency fracture with percutaneous iliosacral compression osteosynthesis with a pelvine internal fixator and cannulated iliosacral screws. <i>European Spine Journal</i> . 2013;22:2619.	Not research
Boobbyer GN. External fixation with the coat hanger method in treatment of unstable fractures of the pelvis. <i>Injury</i> . 1980;11(3):254-6.	Not research
Browner BD, Cole JD. Initial management of pelvic ring disruptions. <i>Instructional Course Lectures</i> . 1988;37:129-37.	Not research
Leslie MP, Baumgaertner MR. Osteoporotic pelvic ring injuries. <i>Orthopedic Clinics of North America</i> . 2013;44(2):217-24.	Not research
Rommens PM, Hofmann A. Comprehensive classification of fragility fractures of the pelvic ring: Recommendations for surgical treatment. <i>Injury</i> . 2013;44(12):1733-44.	Not research
Smith BL. How to manage that pelvic fracture. <i>Modern Medicine</i> . 2005;68(8):30-4; quiz 5.	Not research
Smith JM. Pelvic fractures. <i>Western Journal of Medicine</i> . 1998;168(2):124-5.	Not research
Stahel PF, Mauffrey C, Smith WR, McKean J, Hao J, Burlew CC, et al. External fixation for acute pelvic ring injuries: decision making and technical options. <i>The Journal of Trauma and Acute Care Surgery</i> . 2013;75(5):882-7.	Not research
Whyte Jt. Stress fractures of the pelvis and lower extremities. Diagnosis and management. <i>Advance for Nurse Practitioners</i> . 2005;13(7):55-6, 8-9.	Not research
Wiss DA. What's new in orthopaedic trauma. <i>Journal of Bone & Joint Surgery - American Volume</i> . 2002;84(11):2111-9.	Not research
Youngman JR, Day AC. Pelvic fractures. <i>Hospital Medicine (London)</i> . 2002;63(12):750-2.	Not research
Acker A, Perry ZH, Blum S, et al. Immediate percutaneous sacroiliac screw insertion for unstable pelvic fractures: is it safe enough? <i>European Journal of Trauma & Emergency Surgery</i> 2018;44(2):163-69.	Population
Barei DP, Shafer BL, Beingsner DM, Gardner MJ, Nork SE, Routt ML. The impact of open reduction internal fixation on acute pain management in unstable pelvic ring injuries. <i>Journal of Trauma-Injury Infection & Critical Care</i> . 2010;68(4):949-53.	Population
Bastian JD, Ansoorge A, Tomagra S, Benneker LM, Buchler L, Siebenrock KA, et al. Mid-term outcome following fixation of anterior pelvic ring injuries using the modified Stoppa approach. <i>Swiss Medical Weekly</i> . 2013;143:29S.	Population
Blasier DR, McAtee J, White R, Mitchell DT. Disruption of the pelvic ring in pediatric patients. <i>Clinical Orthopaedics and Related Research</i> . 2000;0(376):87-95.	Population
Chen PH, Hsu WH, Li YY, Huang TW, Huang TJ, Peng KT. Outcome analysis of unstable posterior ring injury of the pelvis: comparison between percutaneous iliosacral screw fixation and conservative treatment. <i>Biomedical Journal</i> . 2013;36(6):289-94.	Population

Dienstknecht T, Berner A, Lenich A, Nerlich M, Fuechtmeier B. A minimally invasive stabilizing system for dorsal pelvic ring injuries. <i>Clinical Orthopaedics & Related Research</i> . 2011;469(11):3209-17.	Population
Dolati B, Spiss R, Ennemoser O, Colleselli K. The fixation of pelvic ring fractures. <i>World Journal of Urology</i> . 1990;7(4):192-6.	Population
Dong J, Hao W, Wang B, Wang L, Li L, Mu W, et al. Management and outcome of pelvic fractures in elderly patients: a retrospective study of 40 cases. <i>Chinese Medical Journal</i> . 2014;127(15):2802-7.	Population
Eckardt H, Egger A, Hasler RM, et al. Good functional outcome in patients suffering fragility fractures of the pelvis treated with percutaneous screw stabilisation: Assessment of complications and factors influencing failure. <i>Injury</i> 2017;48(12):2717-23.	Population
Elzohairy MM, Salama AM. Open reduction internal fixation versus percutaneous iliosacral screw fixation for unstable posterior pelvic ring disruptions. <i>Orthopaedics & traumatology, surgery & research</i> 2017;103(2):223-27.	Population
Fang C, Alabdulrahman H and Pape HC. Complications after percutaneous internal fixator for anterior pelvic ring injuries. <i>Int Orthop</i> 2017; 24:24. DOI:10.1007/s00264-017-3415-4.	Population
Gu R, Huang W, Yang L, et al. Comparisons of front plate, percutaneous sacroiliac screws, and sacroiliac anterior papilionaceous plate in fixation of unstable pelvic fractures. <i>Medicine</i> 2017;96(36):e7775.	Population
Gvozdenovic R, Dahl B, Gehrchen M, Blyme P, Kioer T, Tondevold E. Fixation of unstable posterior pelvic ring fractures - a comparative study [Abstract]. <i>Acta orthopaedica Scandinavica</i> . 1998;69:17.	Population
Hagen J, Castillo R, Dubina A, Gaski G, Manson TT, O'Toole RV. Does Surgical Stabilization of Lateral Compression-type Pelvic Ring Fractures Decrease Patients' Pain, Reduce Narcotic Use, and Improve Mobilization? <i>Clinical Orthopaedics & Related Research</i> . 2016;474(6):1422-9.	Population
Hoch A, Pieroh P, Henkelmann R, et al. In-screw polymethylmethacrylate-augmented sacroiliac screw for the treatment of fragility fractures of the pelvis: a prospective, observational study with 1-year follow-up. <i>BMC surgery</i> 2017;17(1):132.	Population
Hoch A, Schneider I, Todd J, Josten C, Bohme J. Lateral compression type B 2-1 pelvic ring fractures in young patients do not require surgery. <i>European Journal of Trauma & Emergency Surgery</i> . 2016;2:2.	Population
Hong HX, Hong ZH, Chen HX, Lin L, Zhu Z. Iliosacral screw fixation of transforaminal sacral fractures using local anesthesia and CT. <i>Journal of the American College of Surgeons</i> . 2010;211(2):e7-12.	Population
Lansinger O, Karlsson J, Berg U, Mare K. Unstable fractures of the pelvis treated with a trapezoid compression frame. <i>Acta Orthopaedica Scandinavica</i> . 1984;55(3):325-9.	Population
Latenser BA, Gentilello LM, Tarver AA, Thalgot JS, Batdorf JW. Improved outcome with early fixation of skeletally unstable pelvic fractures. <i>Journal of Trauma-Injury Infection & Critical Care</i> . 1991;31(1):28-31.	Population
Lindahl J, Hirvensalo E, Bostman O, Santavirta S. Failure of reduction with an external fixator in the management of injuries of the pelvic ring. Long-term evaluation of 110 patients. <i>Journal of Bone & Joint Surgery - British Volume</i> . 1999;81(6):955-62.	Population
Ma X, Zheng X, Zhao W, et al. Interval versus external fixation for the treatment of pelvic fractures: a comparative study. <i>Clin Invest Med</i> 2017;40(3):E102.	Population
Matta JM, Saucedo T. Internal fixation of pelvic ring fractures. <i>Clinical Orthopaedics & Related Research</i> . 1989;0(242):83-97.	Population
Moed BR, Whiting DR. Locked transsacral screw fixation of bilateral injuries of the posterior pelvic ring: initial clinical series. <i>Journal of Orthopaedic Trauma</i> . 2010;24(10):616-21.	Population
Noser J, Dietrich M, Tiziani S, et al. Mid-term follow-up after surgical treatment of fragility fractures of the pelvis. <i>Injury</i> 2018;49(11):2032-35.	Population
Noser J, Dietrich M, Tiziani S, et al. Mid-term follow-up after surgical treatment of fragility fractures of the pelvis. <i>Injury</i> 2018;49(11):2032-35. doi: 10.1016/j.injury.2018.09.017	Population
Routt ML, Jr., Simonian PT, Grujic L. The retrograde medullary superior pubic ramus screw for the treatment of anterior pelvic ring disruptions: a new technique. <i>Journal of Orthopaedic Trauma</i> . 1995;9(1):35-44.	Population
Salari P, Cannada LK, Moed BR. Do asymptomatic patients have normal function after percutaneous fixation of the posterior pelvic ring? A case-control pilot study. <i>Journal of Orthopaedic Surgery</i> . 2015;10:68.	Population
Scherer J, Tiziani S, Sprengel K, et al. Subcutaneous internal anterior fixation of pelvic fractures-which configuration of the InFix is clinically optimal?-a retrospective study. <i>Int Orthop</i> 2018;08:08.	Population

Schmitz P, Baumann F, Grechenig S, Gaensslen A, Nerlich M, Muller MB. The cement-augmented transiliacal internal fixator (caTIFI): an innovative surgical technique for stabilization of fragility fractures of the pelvis. <i>Injury</i> . 2015;46:S114-20.	Population
Scolaro JA, Firoozabadi R, Routt ML. Treatment of Pediatric and Adolescent Pelvic Ring Injuries With Percutaneous Screw Placement. <i>Journal of Pediatric Orthopedics</i> . 2016;2:2.	Population
Sen RK, Gopinathan NR, Tamuk T, Kumar R, Krishnan V, Sament R. Predictors of early outcome in unstable pelvic fractures. <i>Chinese Journal of Traumatology</i> . 2013;16(2):94-8.	Population
Shui X, Ying X, Mao C, Feng Y, Chen L, Kong J, et al. Percutaneous Screw Fixation of Crescent Fracture-Dislocation of the Sacroiliac Joint. <i>Orthopedics</i> . 2015;38(11):e976-82.	Population
Studer P, Suhm N, Zappe B, Bless N, Jakob M. Pubic rami fractures in the elderly--a neglected injury? <i>Swiss Medical Weekly</i> . 2013;143:w13859.	Population
Sullivan MP, Scolaro JA, Milby AH, Mehta S. Isolated pelvic ring injuries: functional outcomes following percutaneous, posterior fixation. <i>European journal of orthopaedic surgery & traumatologie</i> . 2015;25(6):1025-30.	Population
Tosounidis T, Kanakaris N, Nikolaou V, Tan B, Giannoudis PV. Assessment of Lateral Compression type 1 pelvic ring injuries by intraoperative manipulation: which fracture pattern is unstable? <i>International Orthopaedics</i> . 2012;36(12):2553-8.	Population
Uchida K, Kokubo Y, Yayama T, Nakajima H, Miyazaki T, Negoro K, et al. Fracture of the pelvic ring: A retrospective review of 224 patients treated at a single institution. <i>European Journal of Orthopaedic Surgery and Traumatology</i> . 2011;21(4):251-7.	Population
Vaidya R, Martin AJ, Roth M, et al. Midterm Radiographic and Functional Outcomes of the Anterior Subcutaneous Internal Pelvic Fixator (INFIX) for Pelvic Ring Injuries. <i>J Orthop Trauma</i> 2017;31(5):252-59.	Population
Vaidya R, Martin AJ, Roth M, Tonnos F, Oliphant B, Carlson J. Midterm radiographic and functional outcomes of the anterior internal pelvic fixator (INFIX). <i>Journal of Orthopaedic Trauma</i> . 2017;5:05.	Population
Vanderschot P, Kupperts M, Sermon A, Lateur L. Trans-iliac-sacral-iliac-bar procedure to treat insufficiency fractures of the sacrum. <i>Indian Journal of Orthopaedics</i> . 2009;43(3):245-52.	Population
Wahnert D, Raschke MJ, Fuchs T. Cement augmentation of the navigated iliosacral screw in the treatment of insufficiency fractures of the sacrum: a new method using modified implants. <i>International Orthopaedics</i> . 2013;37(6):1147-50.	Population
Wang H, Fu YH, Ke C, et al. Minimally invasive stabilisation of posterior pelvic ring instabilities with pedicle screws connected to a transverse rod. <i>Int Orthop</i> 2018;42(3):681-86. doi: https://dx.doi.org/10.1007/s00264-017-3714-9	Population
Webb LX, Caldwell K. Disruption of the posterior pelvic ring caused by vertical shear. <i>Southern Medical Journal</i> . 1988;81(10):1217-21.	Population
Wild JJ, Jr., Hanson GW, Tullos HS. Unstable fractures of the pelvis treated by external fixation. <i>Journal of Bone & Joint Surgery - American Volume</i> . 1982;64:1010-1020	Population
Wu X, Liu Z, Fu W, et al. Modified pedicle screw-rod fixation as a minimally invasive treatment for anterior pelvic ring injuries: an initial case series. <i>Journal of Orthopaedic Surgery</i> 2017;12(1):84. doi: https://dx.doi.org/10.1186/s13018-017-0590-3	Population
Yu X, Tang M, Zhou Z, Peng X, Wu T, Sun Y. Minimally invasive treatment for pubic ramus fractures combined with a sacroiliac joint complex injury. <i>International Orthopaedics</i> . 2013;37(8):1547-54.	Population
Hasler R. Surgical Treatment of Low Energy Pelvic Fractures in the Elderly. ClinicalTrials.Gov	Protocol
Jakob M. Treatment of Pelvic Ring Fractures in the Elderly. ClinicalTrials.Gov	Protocol
Nieves JW. PTH (1-34) and Pelvic Fracture Healing - a Randomized Controlled Trial. ClinicalTrials.Gov	Protocol
O'Toole R. Pelvis RCT: Impact of Surgery on Pain in Lateral Compression Type Pelvic Fractures. ClinicalTrials.Gov	Protocol
Zlowodzki M. Comparison of Subcutaneous INFIX and EXFIX for Anterior Pelvic Ring Fractures Requiring Stabilization. ClinicalTrials.Gov	Protocol
Beall DP, Datir A, D'Souza SL, D'Souza LS, Gunda D, Morelli J, et al. Percutaneous treatment of insufficiency fractures : principles, technique and review of literature. <i>Skeletal Radiology</i> . 2010;39(2):117-30.	Study design
Beckmann JT, Presson AP, Curtis SH, Haller JM, Stuart AR, Higgins TF, et al. Operative agreement on lateral compression-1 pelvis fractures. a survey of 111 OTA members. <i>Journal of Orthopaedic Trauma</i> . 2014;28(12):681-5.	Study design
Clamp JA, King RJ, O'Hara JT, Hahn DM. Osteoporotic pelvic insufficiency fracture with gross instability. <i>Journal of Trauma-Injury Infection & Critical Care</i> . 2008;64(5):1380-2.	Study design

De Bastiani G, Aldegheri R, Renzi Brivio L. Dynamic axial fixation. A rational alternative for the external fixation of fractures. <i>International Orthopaedics</i> . 1986;10(2):95-9.	Study design
Dechert TA, Duane TM, Frykberg BP, Aboutanos MB, Malhotra AK, Ivatury RR. Elderly patients with pelvic fracture: interventions and outcomes. <i>American Surgeon</i> . 2009;75(4):291-5.	Study design
Draijer F, Egbers HJ, Havemann D. Quality of life after pelvic ring injuries: follow-up results of a prospective study. <i>Archives of Orthopaedic & Trauma Surgery</i> . 1997;116(1):22-6.	Study design
Firoozabadi R, Oldenburg FP, Krieg JC, Routt MLC. Prevention of iliosacral screw intrusion through the lateral iliac cortex. <i>Techniques in Orthopaedics</i> . 2015;30(1):57-60.	Study design
Gansslen A, Lindahl J. Evaluation tools and outcomes after osteosynthesis of unstable type B and C pelvic ring injuries. <i>Acta Chirurgiae Orthopaedicae et Traumatologiae Cechoslovaca</i> . 2013;80(5):305-20.	Study design
Gerbershagen HJ, Dagtekin O, Mertens N, Isenberg J, Sabatowski R, Petzke F. Prevalence and severity of chronic pain after pelvic ring fracture. <i>European Journal of Pain</i> . 2009;13:S157.	Study design
Hausler SM, Strobl FF, Paprottka P, Pieske O, Rubenbauer B, Jakobs TF, et al. Technical outcome, complications and effective patient dose of percutaneous CT-fluoroscopy guided screw placement for the fixation of unstable pelvic fractures. <i>CardioVascular and Interventional Radiology</i> . 2013;36:S391.	Study design
Kim WY, Lee SW, Kim KW, et al. Minimally invasive surgical treatment using 'iliac pillar' screw for isolated iliac wing fractures in geriatric patients: a new challenge. <i>European journal of trauma and emergency surgery : official publication of the European Trauma Society</i> 2018	Study design
Leberte M, Dabezies E. Pelvic fractures. <i>Orthopedics</i> . 1985;8(1):120-3.	Study design
Lee SW, Kim WY, Koh SJ, et al. Posterior locked lateral compression injury of the pelvis in geriatric patients: an infrequent and specific variant of the fragility fracture of pelvis. <i>Arch Orthop Trauma Surg</i> 2017;137(9):1207-18.	Study design
Minarro JC, Quevedo-Reinoso R, Lopez-Pulido MJ, Gonzalez-Fernandez A. Osteoporotic fractures of the pelvis. <i>Osteoporosis International</i> . 2016;1:S139.	Study design
Pennig D. External and internal fixation in pelvic ring disruption. <i>Journal of the Japanese Orthopaedic Association</i> . 1991;65(3):S557.	Study design
Rommens PM, Ossendorf C, Pairen P, Dietz SO, Wagner D, Hofmann A. Clinical pathways for fragility fractures of the pelvic ring: personal experience and review of the literature. <i>Journal of Orthopaedic Science</i> . 2015;20(1):1-11.	Study design
Routt ML, Jr., Kregor PJ, Simonian PT, Mayo KA. Early results of percutaneous iliosacral screws placed with the patient in the supine position. <i>Journal of Orthopaedic Trauma</i> . 1995;9(3):207-14.	Study design
Rubash HE, Brown TD, Nelson DD, Mears DC. Comparative mechanical performances of some new devices for fixation of unstable pelvic ring fractures. <i>Medical & Biological Engineering & Computing</i> . 1983;21(6):657-63.	Study design
Sanders D, Fox J, Starr A, Sathy A, Chao J. Transsacral-Transiliac Screw Stabilization: Effective for Recalcitrant Pain Due to Sacral Insufficiency Fracture. <i>Journal of Orthopaedic Trauma</i> . 2016;30(9):469-73.	Study design
Schmitz P, Baumann F, Acklin YP, et al. Clinical application of a minimally invasive cement-augmentable Schanz screw rod system to treat pelvic ring fractures. <i>International orthopaedics</i> 2018 doi: 10.1007/s00264-018-3988-6	Study design
Suzuki T, Shindo M, Soma K, Minehara H, Nakamura K, Uchino M, et al. Long-term functional outcome after unstable pelvic ring fracture. <i>Journal of Trauma-Injury Infection & Critical Care</i> . 2007;63(4):884-8.	Study design
Ting B, Zurakowski D, Herder L, Wagner K, Appleton P, Rodriguez EK. Preinjury ambulatory status is associated with 1-year mortality following lateral compression Type I fractures in the geriatric population older than 80 years. <i>The Journal of Trauma and Acute Care Surgery</i> . 2014;76(5):1306-9.	Study design
Dahners LE, Jacobs RR, Jayaraman G, Mathys Jr R. An external skeletal fixation system for unstable pelvic fractures. <i>Surgical Forum</i> . 1983;0:554-6.	Unobtainable
Wang S, Zhang P, Du D, Yang S. Anterior internal fixation to treat vertical unstable pelvic fracture. <i>Chinese Journal of Traumatology</i> . 2002;5(1):59-61.	Unobtainable