

# Sacroiliac joint dysfunction

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## Summary

The current thesis encompasses a thorough investigation into sacroiliac joint (SIJ) dysfunction, with attention for effectiveness of diagnosis, surgical treatment and outcome.

**Chapter one** provides a general introduction of the global prevalence and impact of low back and buttock pain, emphasizing the often-overlooked role of SIJ dysfunction. The chapter covers the anatomy and function of the SIJ, discussing its innervation, motion, and the importance of form and force closure in maintaining stability. Various factors contributing to SIJ dysfunction, including posttraumatic, degenerative, postpartum, post lumbar fusion surgery, and connective tissue disorders, are discussed. Challenges are discussed in diagnosing SIJ dysfunction, outlining symptoms and diagnostic tests, and emphasizes the limited role of imaging. Management strategies, ranging from conservative approaches to surgical options like MISJF, are detailed. The societal impact and costs are briefly touched upon.

**Chapter two** comprises a systematic review and meta-analysis on the effectiveness of MISJF compared to conservative management in patients with SIJ dysfunction. Exploration of the literature indicated a limited availability of studies which met the strict inclusion criteria. Two randomized controlled trials (RCT's) and one retrospective cohort study were included, encompassing 388 patients (207 conservative and 181 surgical). In a pooled mean difference analysis, MISJF demonstrated greater reduction in Visual Analogue Scale (VAS) pain score compared to conservative management; -37.03 points. Moreover, MISJF was associated with a greater reduction in Oswestry Disability Index outcome; -21.14 points. Additionally, one cost-effectiveness analysis was included and favored MISJF. The outcomes of this review must be interpreted with caution due to the important limitation of the small sample size.

**Chapter three** presents a double-center observational study to investigate the clinical results and safety of MISJF over a one-year observation period at Zuyderland Medical Center and Medical Spectrum Twente. A total of 29 patients were included. In 44.8% of patients SIJ dysfunction was of postpartum origin. Statistically significant and clinically relevant improvements in pain (VAS-pain score improved from 7.83 ( $\pm 1.71$ ) to 4.97 ( $\pm 2.63$ )) and quality of life (EQ-5D-3L score, improved from 0.266 ( $\pm 0.129$ ) to 0.499 ( $\pm 0.260$ )) were observed

one-year postoperatively. Opioid consumption decreased from 44.8% to 24.1% postoperatively ( $p=0.026$ ). In 13.7% of patients an adverse event (AE) occurred, comparable to current literature.

**Chapter four** explores physical activity in patients with postpartum SIJ dysfunction before and after MISJF compared to age-, BMI-, gender- and postpartum-matched controls. Physical activity was measured using triaxial accelerometer for seven consecutive days, before surgery and three months after surgery. The study revealed that physical activity in patients with postpartum SIJ dysfunction does not improve three months following MISJF, while quality of life does improve significantly. The discrepancy between these two observations raises questions about the relationship between quality of life and physical activity.

**Chapter five** is a cross-sectional case-control study that aims to investigate spatiotemporal parameters, center of pressure and mass, pelvic angles and other joint angles in patients with SIJ dysfunction in comparison with healthy controls. Thirty subjects were recruited for this study; ten patients, ten matched controls and ten healthy student controls. Patients showed an impaired gait, with a lower cadence, longer double support phase, shorter step length and slower walking speed than controls. Also, more balance problems during standing on a single leg and standing up from a chair were observed compared to controls.

**Chapter six** is the longitudinal follow-up study of chapter five and is conducted to analyze the changes in motion patterns in patients with SIJ dysfunction three months after MISJF. Balance improvements during a single-leg-stance and a faster sit-to-stance execution time were observed after surgery and were now comparable to that of matched controls. Gait analysis revealed no improvement in any of the measured parameters when comparing pre- and postoperative.

**Chapter seven** shows the study protocol for the SACRIFICE study. A multicenter RCT for the effectiveness of MISJF compared to prolonged conservative therapy in SIJ dysfunction. The aim of this study is to perform the first industry-independent RCT of MISJF versus conservative treatment with a comprehensive assessment of clinical and economic effects. All included patients diagnosed with SIJ dysfunction will be randomized to either prolonged standardized conservative treatment or operative treatment. Patients in the

conservative group may undergo MISJF earliest after 6 months. The primary outcome is back function. Secondary outcome measures include cost-effectiveness from a healthcare and societal perspective.

**Chapter eight** presents a prospective, double blind RCT to investigate the effectiveness of intraoperative SIJ infiltration with bupivacaine 0.50% versus placebo (NaCl 0.9%) in reducing postoperative pain after MISJF. Results of the study revealed that bupivacaine is not effective in reducing postoperative pain. No changes in pain scores in comparison with placebo, neither as group-effect ( $p=0.68$ ), nor dependent on time (group\*time:  $p=0.87$ ) were present. The secondary outcome parameters, which were opioid consumption, patient satisfaction, adverse events, and hospital stay, were also not different in the postoperative period between study groups.