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Clinical Study

Postoperative complications in patients undergoing minimally invasive sacroiliac fusion

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Abstract

BACKGROUND CONTEXT: Minimally invasive sacroiliac (SI) joint fusion has become increasingly relevant in recent years as a treatment for SI joint pathology. Previous studies have found minimally invasive SI fusion to be an effective and safe treatment option for chronic SI joint pain. However, these studies have been primarily single-center, case-based, or manufacturer-sponsored investigations, and as such their findings are limited to their sample populations.

PURPOSE: The aim of this study was to investigate the safety of minimally invasive SI fusion using a large nationwide sample group to more accurately identify complication rates of this increasingly popular procedure.

STUDY DESIGN/SETTING: This is a retrospective database study.

PATIENT SAMPLE: The sample includes patients within the orthopedic subset of Humana database who underwent minimally invasive SI fusion between 2007 and 2014.

OUTCOME MEASURES: Complications and novel lumbar and nerve pathology were the outcome measures.

METHODS: Patients undergoing minimally invasive SI fusion from 2007 to 2014 were identified using the Pearl Diver patient record database (Pearl Diver Technologies, West Conshohocken, PA, USA) from the nationwide private insurance provider Humana Inc. This approach provided access to records of over 18 million patients in every major geographic region of the country. Using the

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ICD-9 diagnosis codes (International Classification of Diseases 9th edition), data from patient records were analyzed to reveal incidence of postoperative infection, pain, osteomyelitis, joint derangement, urinary tract infection, and novel lumbar and nervous system pathology.

RESULTS: Four hundred sixty-nine patients (305 female; 164 male) within the Humana insurance database received minimally invasive SI fusion between 2007 and 2014. Data from these patients showed a substantial increase in the use of the procedure over this 7-year period. Among these patients, an overall complication rate of 13.2% (n=62) was seen at 90 days postoperatively and 16.4% (n=77) at 6 months. The number of patients receiving a first time diagnosis of lumbar pathology following minimally invasive SI fusion in the sample population was also analyzed. The incidence of novel lumbar pathology in this population was 3.6% (n=17) at 90 days postoperatively and 5.3% (n=25) at 6 months. Men experienced diagnoses of novel lumbar pathology at higher rates than women within both 90 days (men=6.7%; women≤3.3%) and 6 months (men=9.1%; women≤3.3%) of the procedure ($p<.01$).

CONCLUSIONS: The results of this study show that minimally invasive SI joint fusion could possibly carry higher risks of complications than previously stated. These findings are useful for physicians and patients when considering treatment for chronic SI joint pain.

Keywords: Infection; Joint derangement; Minimally invasive surgery; Osteomyelitis; Pain; Sacroiliac joint fusion

Introduction

Minimally invasive sacroiliac (SI) fusion has become an increasingly popular treatment for non-traumatic SI joint pain in the United States in recent years [1]. Using a system of percutaneous implants to stabilize the SI joint, the procedure offers a surgical option for patients with chronic SI joint pain who have exhausted less invasive treatment options. Sacroiliac joint pain has been well documented as the underlying cause of 15% to 30% of lower back pain cases in the United States [2–6]. Lower back pain is one of the top three causes of chronic pain in developed countries and costs the US economy an estimated $60 to 100 billion annually [7–10]. Establishing a safe and effective treatment option for SI joint pathology has the potential to make an enormous positive impact on the quality of life in the United States.

Traditionally, open SI arthrodesis has been an option for treating SI pain when non-surgical treatments such as physical therapy, SI joint injections, non-steroidal anti-inflammatory drugs, and medical pain management have failed [11]. However, the use of this procedure has been limited because of the risks involved with large incision, bone harvesting, long hospital stay, and damage to pelvic structures [12–16]. The development of the percutaneous minimally invasive SI fusion technique was first reported in 2004 and has sought to reduce these risks to make SI fusion a viable treatment option for SI joint pain [11,17,18]. Numerous studies have been published in recent years reporting minimally invasive SI fusion to be effective in treating SI joint pain [11,18–22]. Many of these studies have shown adverse events and low reoperation rates when compared with the open procedure, and report a high degree of patient satisfaction using the new minimally invasive technique [17,18,21,22]. Minimally invasive SI fusion has also been shown to decrease treatment costs for SI joint pain, with a potential savings to the US Medicare system of $660 million over the course of the patient's lifetime [23]. Possibly as a result of this combination of factors, minimally invasive SI fusion has become a widely used technique: In 2012, more than 87% of all SI arthrodesis performed by polled surgeons from the International Society for the Advancement of Spinal Surgery (ISASS) and Society for Minimally Invasive Spine Surgery (SMISS) were minimally invasive, and based on trends in recent years today this number is likely even higher [1].

This increased use of minimally invasive SI fusion to treat SI joint pathology has created the need for reliable data addressing the safety of the procedure. Existing literature has largely failed to sufficiently address this issue. Most studies have focused primarily on efficacy and patient satisfaction, and those that have attempted to address the issue of safety have lacked sample sizes large enough to reliably do so [2,18,20,22,24]. Primarily, this has been due to the fact that minimally invasive SI is a relatively new procedure, and as a result acquiring a large sample population for a study can be difficult. Additionally, the majority of existing studies are case series, and as such their findings are limited to their sample populations. The aim of this study was to analyze trends of SI fusion complications using a large nationwide patient population to more accurately identify complication rates of this increasingly popular procedure.

Materials and methods

A search of medical billing records from the nationwide insurance provider Humana Inc was performed using the commercially available Pearl Diver patient record database (Pearl Diver Technologies, West Conshohocken, PA, USA). The Humana database provides medical records of over 18,620,198 patients from every major geographic region of the country. Using the International Classification of Disease, Ninth Revision (ICD-9) codes and the Current Procedural Terminology