



Review

Caesarean section rates following pelvic fracture: A systematic review



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ABSTRACT

Background: Following pelvic fracture in females of childbearing age, the question of whether or not natural pregnancy and childbirth can occur is often asked by both patients and clinicians. The following is a systematic review of the literature examining caesarean section rate in patients with prior pelvic fracture.

Methods: An extensive search of the English-language literature was performed to include all articles describing pregnancy outcomes in women with prior pelvic fracture. The primary outcomes analyzed were vaginal delivery and caesarean section. Secondary outcomes investigated included the rate of new caesarean section, indications for caesarean section, and caesarean section rates with operative versus nonoperative treatment of the pelvic fracture.

Results: Eight articles assessing 148 patients who underwent childbirth after pelvic fracture were eligible for inclusion. Among the 148 patients who underwent childbirth after pelvic fracture, 79 (53%) delivered vaginally and 69 (47%) underwent caesarean section. When patients who had already undergone a caesarean section prior to their pelvic fracture were excluded, 137 patients remained. Among these 137 patients, 79 (58%) delivered vaginally and 58 (42%) had caesarean section performed. Indications for caesarean section were sporadically listed but in some series did include patient or obstetrician preference as a result of prior pelvic fracture. Prior pelvic fixation had no demonstrable effect on pregnancy outcomes ($p > 0.05$).

Conclusions: Patients with prior pelvic fracture undergo caesarean section at a rate greater than those without prior pelvic fracture. The cause for this is not entirely understood but seems to be related at least in part to patient and obstetrician bias rather than solely due to the pelvic fracture and cephalopelvic disproportion.

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Introduction

Pelvic fractures are present in roughly 9% of all blunt trauma patients treated per year in the United States [1]. Many of these patients are females who may become pregnant later in life. The consequences of these fractures are described only sporadically throughout the literature. Much of the literature regarding pelvic fracture and pregnancy deals with patients sustaining pelvic fracture while pregnant [2–5]. Descriptions of the long-term consequences of pelvic fracture in women of child-bearing age are much less frequent. Women of childbearing age who have sustained a pelvic fracture often raise concerns with their physicians as to how their injury will affect their reproductive capability. The orthopaedic surgeon (even those not typically involved in the acute treatment of patients with pelvic fracture) may be a source of information to the patient and obstetrician regarding what impact the fracture may have on future pregnancy. The current articles on this subject are limited by low sample sizes and therefore are limited in their ability to guide the orthopaedic surgeon and obstetrician in prognosis and clinical decision making. Therefore, a systematic review was performed in order to help better understand the consequences of pelvic fracture on future pregnancy.

Materials and methods

Literature search

An exhaustive database search was performed utilizing the National Library of Medicine and Medline and Embase databases; the search was comprised of English language studies involving human subjects published between January 1950 and March 2013. The keywords used in the Boolean search were as follows: (pregnancy OR childbirth OR reproductive) AND pelvic AND fracture. Limits of English language and human subjects were applied to the search. The bibliography listed in each of these papers was also evaluated for the presence of additional pertinent articles to ensure a thorough and complete literature review.

Evaluating articles and weighing strength of evidence

The titles and abstracts of the articles produced by the literature search were evaluated and based on this preliminary evaluation, original scientific articles were chosen for review. Articles chosen were then categorized according to the level of evidence as follows: level I – high-quality prospective randomized clinical trials; level II – lesser-quality randomized controlled trials, prospective comparative studies; level III – case-control studies, retrospective comparative studies; level IV – case series; level V – expert opinion, case reports.

Objectives and paper selection criteria

The objectives of this systematic review were to address the following questions:

1. What is the overall incidence of caesarean section in women giving birth following pelvic fracture?
2. What is the incidence of new caesarean section in women giving birth following pelvic fracture (women with prior caesarean section excluded)?
3. What is/are the indications for caesarean section after pelvic fracture?
4. Is there any difference in pregnancy outcomes (caesarean section rates) after pelvic fracture among women who underwent operative fixation, versus those undergoing nonoperative treatment?

The criteria for identifying the subset of data pertaining to Question 1 (incidence of caesarean section following pelvic fracture) consisted of data collected from (1) clinical studies with a focus on pregnancy outcomes following pelvic ring injury; (2) clinical studies where data pertaining to pregnancy outcomes following trauma that could be extracted from a larger series.

The criteria for identifying the subset of data pertaining to Question 2 (incidence of new caesarean section following pelvic fracture) consisted of data collected from (1) clinical studies with a focus on pregnancy outcomes following pelvic ring injury that specified those patients who had caesarean section prior to pelvic fracture; (2) clinical studies where data pertaining to pregnancy outcomes following trauma that could be extracted from a larger series.

The criteria for identifying the subset of data pertaining to Question 3 (indications for caesarean section following pelvic fracture) consisted of data collected from: clinical studies where pregnancy was described in any patient following pelvic fracture. From these studies any listed indication for caesarean section was recorded and discussed. Additionally, patient factors of interest in those patients who delivered both by c-section and vaginally was noted and analyzed.

The criteria for identifying the subset of data pertaining to Question 4 (difference in outcomes operative versus nonoperative pelvic fracture) consisted of data collected from (1) clinical studies with a focus on pregnancy outcomes following pelvic ring injury where type of treatment for pelvic fracture (operative versus nonoperative) was specified; (2) clinical studies where data pertaining to pregnancy outcomes following trauma that could be extracted from a larger series.

Statistical analysis

In order to evaluate for statistical significance between groups pertaining to each of the questions, comparisons were made between groups utilizing a Binomial Proportion Test. This was utilized to detect a difference between two different proportions (i.e. rates of caesarean section). Assumption for the tests performed include that variables are dichotomous (i.e. 50/50, yes/no), assuming an equal chance of either occurrence [6]. Z scores from 1.65 to 1.95 are considered significant at the 0.05 with a 1-tailed test.

Results

The database searches resulted in a total of 127 articles. Papers involving non-human subjects or those in languages other than English were excluded as part of the search. Among the 127 papers, 7 pertinent papers were found through review of titles and abstracts. After reviewing the references of each of these 7 articles, 1 additional article in the English language was found. This resulted in 8 pertinent articles available for review which reported the pregnancy outcome of females with history of pelvic fracture prior to becoming pregnant (Fig. 1). The papers were categorized in accordance with their level of evidence as follows: level I – 0; level II – 0; level III – 2; level IV – 5; level V – 1.

A total number of 8 papers pertaining to Question 1 (overall incidence for a woman to undergo caesarean section following pelvic fracture) were identified following the aforementioned criteria. These studies are listed in Table 1 with their respective outcomes. Copeland et al. [7] performed a retrospective case-control study evaluating the impact of pelvic fractures on genitourinary, sexual, and reproductive function in females age 16–44. They attempted to correlate dysfunction to mechanism, severity of injury, and initial displacement of fracture. Two groups were analyzed in this study: (1) trauma patients with pelvic fracture, and (2) trauma patients without pelvic fracture but at

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