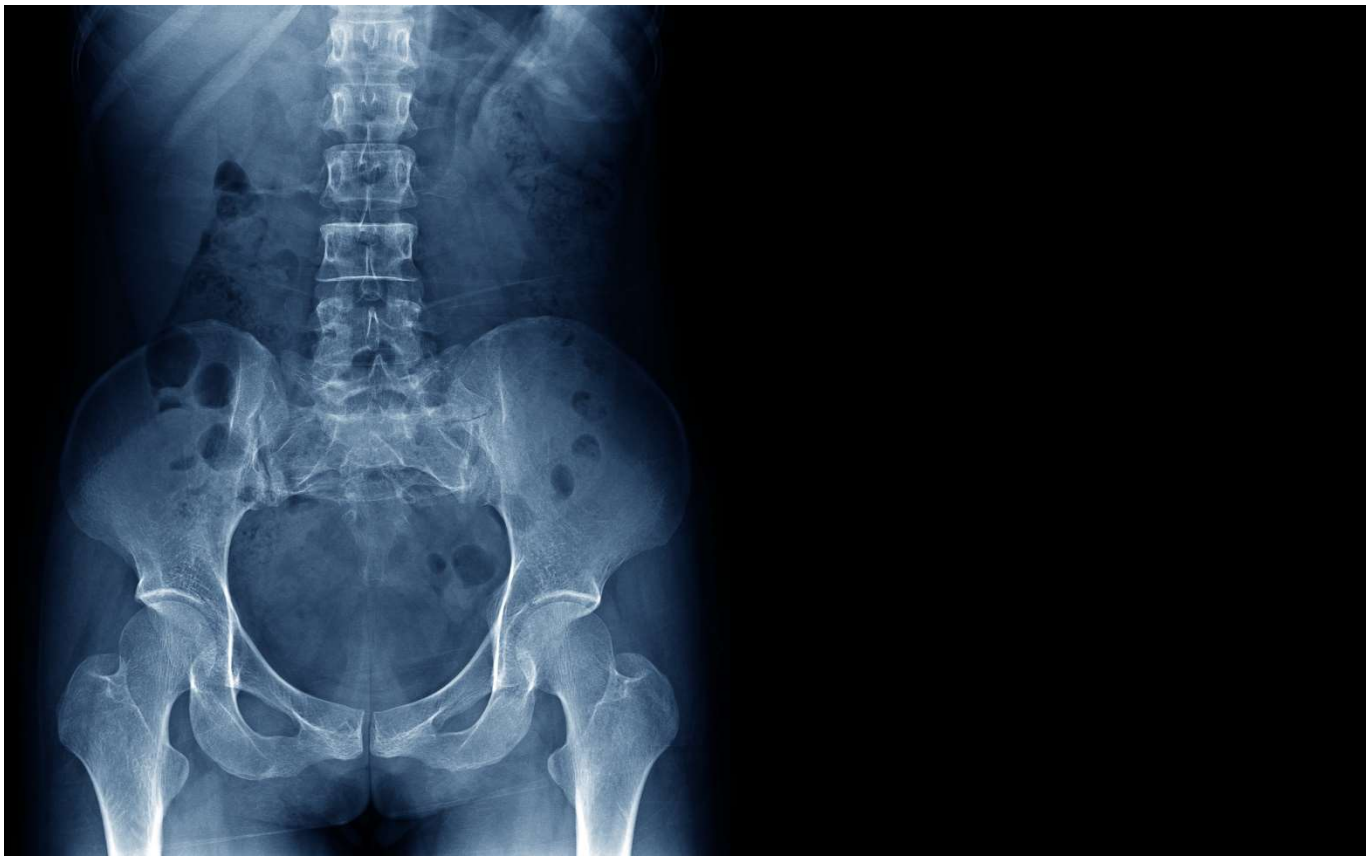

ORTHOPAEDIC CONDITIONS WITH AN IMPACT ON THE DELIVERY METHOD – REVIEW

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ABSTRACT

Almost in every country, the Caesarean section (CS) delivery ratio has been gradually increasing. Among the orthopaedic conditions, only a few are absolute indications for CS, such as pelvic deformations, which is mechanical obstacle in delivery. In addition, we can also name conditions such as pelvic injury or history of pelvic treatments (e.g. acetabular osteotomy) which may affect the way of childbirth. A full-text scientific publication search in PubMed and review of the latest guidelines was conducted. Following phrases were applied in the search strategy: 'Caesarean section', 'complications', 'labour', 'orthopaedic indications', and 'pregnancy'. Orthopaedic indications are usually elective, so every case should be thoroughly considered before the time of delivery. Analysis of women who had undergone an acetabular osteotomy revealed that there are no significant changes in diameters before and after unilateral procedures. However, after bilateral acetabular osteotomy, Caesarean section is rather advisable. Pregnant women with a history of pelvic fracture, have a Caesarean section more than twice as much as the general population. After surgical treatment, the vaginal delivery is still highly probable. Due to the multiplicity of factors determining the qualification criteria for orthopaedic indications, each case should be considered individually. Vaginal delivery is possible after many orthopaedic operations, including post-traumatic pelvic surgery. However, few studies have been carried out to precisely identify indications for CS due to orthopaedic conditions.

BACKGROUND

In the recent years, the number of Caesarean sections (CS) has been an increasing. Extensive analysis revealed that the global percentage of CSs has increased by 12.4% (from 6.7% to 19.1%). At the same time, research showed that this trend applied to almost all countries in the world [1]. Data from 2014 showed that the percentage incidence of CSs was 273/1000 births in the EU, and 357/1000 births in Poland [2]. However, these data stand in opposition to the World Health Organization (WHO) official guidelines, which state, that the optimal percentage of Caesarean delivery should remain between 10%-15% of births [3]. At the same time, research pointed to a general increase in the risk for the mother to be delivered by Caesarean section [4]. It seems reasonable to analyse any indications for CS in terms of evidence based medicine. In the European guidelines of gynaecological societies anatomical pelvic malformations are considered as absolute indications for CS [5]. We should also mention, that orthopaedic indications are usually leading to elective CSs. In most cases, it is possible to plan ahead and carefully consider the indications in order to choose the appropriate method of delivery. Unfortunately, there are few reviews available which focus on orthopaedic relative indications. This article aims to examine this topic based on data retrieved from medical databases.

MATERIALS

An in-depth review of full-text scientific publications was carried out to include data from articles and latest guidelines which describe orthopaedic, both absolute and relative, indications for Caesarean section. PubMed search engine was used for the articles retrieval. Following phrases were applied in the search: 'Caesarean section', 'complications', 'labour', 'orthopaedic indications', and 'pregnancy'. 44 abstracts were found using this method. Subsequently, 26 abstracts were selected for full text analysis. Finally, 16 articles were included in the review.

RESULTS

Congenital and acquired pelvic deformation.

Maternal pelvic deformity, which include anatomical malformations, both congenital and acquired, can be a delivery obstacle and is a relative indication for Caesarean section. Also changes in the hip joints hindering delivery can lead to CS. Research showed that from 38 pregnant women with luxation coxae congenita, 23 (60.53%) had a vaginal delivery (VD) and 15 (39.47%) delivered by CS [6]. Dissection of pubic symphysis during pregnancy is a relative indication for CS. However, it should be taken into consideration, that approximately 50% of the women may suffer recurrence if the conservative treatment was chosen [7].

Acetabular osteotomy

This procedure is performed in young patients as a treatment of hip dysplasia and often rises doubts whether it is an indication for Caesarean section. According to research which included 17 women after the bernese periacetabular osteotomy (PAO), who gave birth to 28 children, 18 children were delivered spontaneously and 10 by CS [8]. This research showed that there were no significant changes of the radiological pelvic diameters before and after the surgery. Transverse diameter of inlet was 15.4 cm before PAO and 15.7 cm after PAO. Distance between the ischial spines was 11.8 cm before PAO, and 11.8 cm after PAO and transverse diameter of outlet was 14.2 cm before PAO, and 13.7 cm after PAO. What is more, birthweight did not correlate neither with the duration of delivery nor with the indication for performing a CS.

Additionally, research over curved periacetabular osteotomy (CPO), which analysed five transverse diameters in 29 patients after bilateral CPO (pelvic inlet, contraction, outlet, expansion and teardrop) showed that both pelvic expansion and teardrop significantly decreased after these procedure ($p<0.01$), while other diameters revealed no significant changes [9]. In all cases the pelvic teardrop was the narrowest diameter of the bony birth canal. The probability of childbirth by Caesarean section is much more higher when the dimension of teardrop is less than 95 mm [10]. In 24 patients (82.8%) this diameter was greater than 95 mm, while in 5 patients (17.2%) it was less than 95 mm.

Other results related to the study of 19 patients after unilateral and bilateral osteotomy. After unilateral osteotomy, the dimension in the plane of the pelvic inlet and the plane of the greatest pelvic dimension increased in 51% patients, in 34% cases remained unchanged and in 15% of patients decreased [11]. The most critical dimension of birth canal decreased on average from 0.016 cm in interspinous distance, in the plane of the least pelvic dimension to 0.695 cm in intercristal distance, in the plane of the pelvic outlet. More significant decrease, from 0.225 cm (2.05%) to 1.00 cm (9.51%), was after bilateral osteotomy.

Pelvic fracture

Every pelvic fracture can potentially make vaginal delivery impossible, but there are still no specific guidelines for choosing methods of delivery after such condition. Research analysing 29 women after pelvic injury showed that sixteen women had 25 vaginal deliveries and thirteen women had 26 Caesarean deliveries [12]. The postinjury Caesarean delivery rate was 44% versus 17% preinjury ($p=0.02$). Seven women (54%) reported 12 Caesarean deliveries (46%) as a result of history of pelvic fracture; three of them chose CS despite the fact that their physician offered a trial of vaginal labour. Four had a CS resulting from medical complications and two had a Caesarean section as repeat procedure after preinjury CS. A systematic review of the literature revealed 137 pregnant women who had prior undergone a pelvic fracture [13]. Among these patients, 79 (58%) had a vaginal delivery and 58 (42%) had a Caesarean section. There were few indications for

CS described, but some included patient's or obstetrician's preferences due to prior fracture. It revealed that women with prior pelvic injury had a greater Caesarean delivery rate than those without pelvic injury in the past. Also, another research showed that after pelvic fracture the Caesarean section rate exceeds more than double standard norms [14].

Total hip arthroplasty (THA)

Other research revealed that patients after total hip arthroplasty (THA) had no absolute indications for Caesarean section [15]. The study group consisted of 47 pregnant primiparas, who had prior a primary THA. Thirty patients had a vaginal delivery and other seventeen gave birth by CS. What is also important, the research showed that the childbirth was not affected by the history of a total hip arthroplasty. Moreover, pregnancy and delivery had no impact on prosthesis survival.

DISCUSSION

A thorough review of publications and medical guidelines showed that very few studies have been carried out to determine orthopaedic indications for Caesarean section. Presented review revealed that after some common orthopaedic interventions, related to interference into the pelvic structure potentially affecting the birth canal, vaginal delivery was still possible. Some varieties of PAO operations do not cause significant changes in the dimensions of the birth canal, so history of such procedure does not disqualify women from vaginal delivery. However, after a bilateral operation, the Caesarean section should be considered as the first choice of delivery mode. Studies showed that after pelvic bone fractures, even those treated surgically, vaginal delivery was still possible. The history of PAO or pelvic fracture are not frequent phenomena, so in these special situations and in other similar conditions, related to interference in the pelvic structures, additional imaging examinations may be justified. It was also confirmed that the percentage of Caesarean sections in patients after specific orthopaedic procedures was twice as high as in the general population. Moreover, women with orthopaedic medical history had more Caesarean sections even if there were no absolute indications for these procedures.

CONCLUSIONS

Orthopaedic indications for Caesarean section are usually elective, which allows accurate assessment during pregnancy by orthopaedic surgeon. Due to the multiplicity of factors determining the qualification criteria for orthopaedic indications, each case should be considered individually. Vaginal delivery is possible after many orthopaedic operations, including post-traumatic pelvic surgery. However, few studies have been carried out to precisely identify indications for CS. The increased number of Caesarean sections is a worrying trend. What is more, there is no precise guidelines for orthopaedic indication for CS. Therefore more research on this issue is needed.

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ABBREVIATIONS

CPO – curved periacetabular osteotomy
CS – Caesarean section
PAO – periacetabular osteotomy
THA – total hip arthroplasty
VD – vaginal delivery

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