



Review

Evolving understanding and treatment of labour dystocia

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ARTICLE INFO

Article history:

Received 16 June 2014

Received in revised form 17 August 2014

Accepted 3 September 2014

Keywords:

Review
Labour
Dystocia
Diagnosis
Treatment

ABSTRACT

The objective of the review is to critically review the diagnosis and management of dystocia in the first stage of labour. We conducted a narrative review of research since 1998. Eight studies were identified, four about the onset and duration of active phase of the first stage of labour, one on the diagnosis of dystocia, and three focused on the treatment of dystocia. The review demonstrates that current understandings of dystocia rest on outdated definitions of active first stage of labour, its progress and on treatments with an equivocal evidence base. These include the cervical dilatation threshold for active first stage, uncertainty over whether a reduced rate of dilatation and reduced strength of uterine contractions always represent pathology and the effectiveness of amniotomy/oxytocin for treating dystocia. Prospective studies should evaluate the impact of defining the active phase of the first stage of labour as commencing at 6 cm dilated and should test this definition in combination with Zhang's revised partogram.

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Introduction

Dystocia remains the most common indication for emergency caesarean section in England and for primary caesarean section in the

USA. As such it is a major contributor to operative and instrumental intervention, especially in nulliparous women. Yet it remains an enigma with a plethora of diagnostic terms attributed to it ('prolonged labour', 'failure to progress') and contrasting thresholds for initiating intervention in clinical practice. This was clearly illustrated in Bragg's survey of caesarean section rates in English maternity hospitals [1] and in Brennan's comparative analysis of international caesarean section rate using 10-group classification [2].

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Dystocia is caused by a combination of factors that traditionally have been understood to either involve the expulsive forces (uterine contraction or powers), or presentation, position, and fetal development (passenger) or the maternal bony pelvis (passage) or a combination of these [3]. This suggests two types of dystocia: a mechanical obstruction (mechanical dystocia) and one that is related to contractions (functional dystocia). The former is still common in low income countries. Lack of cervical dilation and fetal descent in the presence of strong uterine contractions is a defining characteristic of obstructed dystocia distinguishing it from functional dystocia. In high income countries functional dystocia is far more common and has variously been called 'hypotonic uterine dysfunction' 'in-coordinate uterine contractions', 'inefficient uterine contractions' or 'uterine inertia' [4]. This review pertains to functional dystocia only.

Dystocia is further complicated by the inexactness around defining the onset of labour and normal labour length. Friedman [5] set the original template for both of these in the 1950s but this has been revised in the decades since. For example, the transition from latent to active phase of labour of the first stage of labour has changed from 2 cm to 4 cm over a 60-year period.

We undertook a critical narrative review, rather than systematic review because the scope of dystocia is so broad and multi-layered. This included an examination of research into the definition of the active phase of the first stage of normal labour, its length and progression, establishing benchmarks from which dystocia can be usefully differentiated. We then reviewed research into the diagnosis and treatment of dystocia. Much of the research and reviews were undertaken within the past 15 years and have not been previously overviewed in this way. The following questions drove the review:

1. What are the definition, length and rate of progress of the active phase of the first stage of normal labour?
2. What criteria should be used to diagnose dystocia in the first stage labour?
3. What is the most effective treatment of dystocia in the first stage labour?

Methods

We conducted a systematic search of six databases for original research or systematic review of research published in English from 1998 up to July 2013. Our search terms were 'dystocia', 'uterine inertia', 'uterine dysfunction', 'hypotonic uterine activity', 'inefficient uterine contractions', 'dysfunctional uterine contractions', 'dysfunctional labour', 'incoordinate uterine contractions', 'labour arrest', 'failure to progress' and 'obstetric labour complication'. We used MeSH terms for the PUBMED search and the above search terms in the following databases: EMBASE, CINAHL, Cochrane, ASSIA and PsycINFO.

Initial searches returned 5945 titles, which were screened on title and abstract, leaving 39 articles. Full texts were then assessed for relevance to the research questions. We grouped the identified papers according to the three questions. Papers already included in systematic reviews were removed. Eight articles remained. Four of these were systematic reviews [6–9], one was a randomized controlled trial (RCT) [10] and three were retrospective, observational studies [11–13]. Four were about onset, length and rate of progress of active labour [9,11–13], one was about the diagnosis of dystocia [6] and three were about treatment of dystocia [7,8,10]. There was considerable heterogeneity within and between categories as different parameters were used by authors in defining the onset and progress of the first stage of labour and in defining dystocia. We deliberately did not

disentangle these as it is illustrative of the complexity of this topic and the importance of developing a contemporary research agenda to address these contentions.

Onset, rate of progress and length of active phase of the first stage of labour

In this category, there were 4 studies. Neal et al. [9] undertook a systematic review (18 studies from 1990 to 2008), describing cervical dilation rates and labour duration among low-risk, nulliparous women with spontaneous labour onset. Their criterion for onset of the active phase was between 3 and 5 cm dilation and reported that the mean 'active labour' duration of the first stage was 6.0 h, compared with 4.6 h of Friedman [5] and the calculated dilation rate was 1.2 cm/h. The slowest normal labour lasted 13.4 h, compared with Friedman's 11.7 h, with a dilatation rate of 0.6 cm/h. Neal and colleagues concluded that nulliparous women in spontaneous labour have longer active labours and slower dilatation rates than traditionally associated with active labour. They acknowledge that many of the selected studies included women who had other interventions like epidurals, amniotomy and oxytocin but argues this reflects the diversity of contemporary practice. In the studies of specifically low risk women who laboured without oxytocin or epidurals, the mean active labour duration was 7.7 h with the slowest labours lasting 19.4 h.

There were three other studies that examined labour length and rate of dilatation. All were from North America and undertaken by Zhang et al. [11–13].

The first was a retrospective, observational study [11], of 1329 nulliparous who had a spontaneous onset of labour and spontaneous vaginal births. They reported a mean duration of the active phase of the first stage of labour of 5.5 h to get from 4 cm to 10 cm of cervical dilatation, compared with Friedman's mean of 2.5 h in the 1960s and 4.6 h in the 1950s. Zhang also challenged Friedman's continuous linear upward curve of dilatation which he had filled in from averaging out interval rectal/vaginal examination findings. Zhang's research was able to demonstrate much more variation between women with most entering active phase between 3 and 5 cm dilated, though a significant number were not in active phase until 6 cm. Zhang and colleagues did not define the onset of active phase at a particular dilatation but judged that it occurred when the rate of dilatation accelerated and continued to accelerate towards full dilatation. The paper also suggested that cervical dilatation was more likely to be step-like, rather than continuous and linear. In their study they found that many nulliparous women would stay at 5, 6 or 7 cm for up to 2 h and then dilate suddenly by 2 cm or more.

In a much larger multi-centre retrospective study of 62,415 women of mixed parity with spontaneous labour onset and spontaneous vaginal births, Zhang et al. [12] confirmed earlier findings of a slow dilatation pattern up to 6 cm in nulliparous women and extended it to multiparous women. They reported that labour may take more than 6 h to progress from 4 to 5 cm and more than 3 h to progress from 5 to 6 cm of dilation. Nulliparous and multiparous women appeared to progress at a similar pace before 6 cm. However, after 6 cm, labour accelerated much faster in multiparous than in nulliparous women.

Zhang and colleagues recommended a revised partogram premised on the active phase commencing at 6 cm. Instead of a continuous curve, their partogram was step-like to reflect the greater variation in the acceleration rates of dilatation within individual labours (Fig. 1). They argue that adopting this more flexible partogram would reduce the incidence of caesarean section for dystocia.

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