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## **Fetal breech presentation: impact on perinatal posture and locomotion**

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2009

### **document version**

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### **citation for published version (APA)**

Fong, B. F. (2009). *Fetal breech presentation: impact on perinatal posture and locomotion: A longitudinal study*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam].

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**Findings on three fetuses spontaneously  
verted from breech to cephalic presentation**





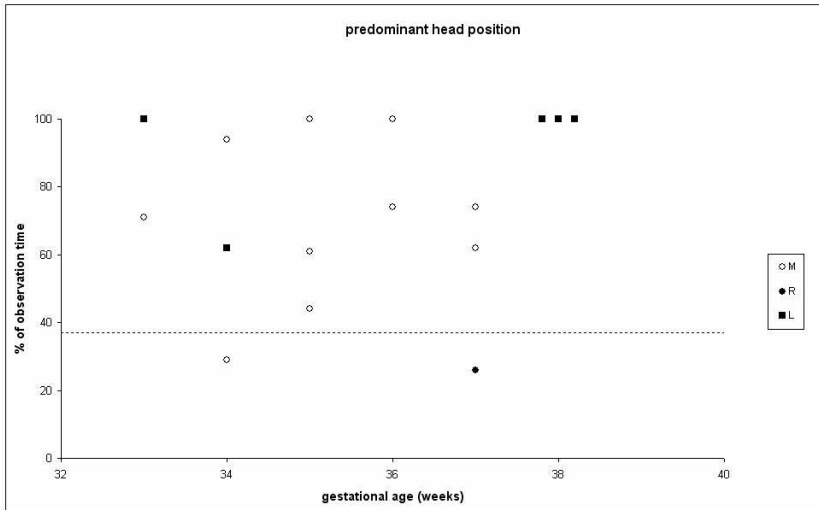
Spontaneous version from breech to cephalic presentation in otherwise uncomplicated pregnancies is the most ideal way to study the effect of a limited duration of breech presentation on different aspects of fetal and neonatal development. Adopting the cephalic presentation is thought to be the result of an active process whereby a mobile, normally proportioned fetus in an average volume of amniotic fluid finds the position of best fit in the available intrauterine space. Spontaneous version is reported to occur in about 50 % of breech fetuses after 32 weeks gestational age [1], while it was less likely to occur in fetuses with extended fetal legs, low birth-weight, short umbilical cord and primiparity. Three fetuses who were originally in our breech group spontaneously verted to cephalic presentation before birth. They did so at 34 (fetus SV-2), 36 (SV-1) and 37 (SV-3) weeks gestational age. Because of the small number of these spontaneously verted (SV) fetuses we chose to exclude them from the analyses and present the prenatal data on them here separately.

### ***Head position preference***

In our group of cephalic fetuses we observed a right-sided head position preference after 36 weeks gestational age. The breech fetuses did not show a significant increase in lateralised head-positions with advancing gestational age [2] (chapter 2 in this thesis).

The three spontaneously verted fetuses showed no significant increase in percentage of recording time with a lateralised head position when comparing the data before 36 weeks with those thereafter (*Wilcoxon signed rank test*;  $p=0.750$ ) (fig. 1). However, all three SV-fetuses showed head position predominance to the left in the final recording before birth (around 38 weeks gestational age). Our findings in the group of cephalic fetuses on the association between the orientation of the fetal vertebral column and head-position predominance support Previc's left-otolithic dominance theory [5]. The same goes for these three fetuses. Contrary to both study groups, the SV-fetuses had their backs to the right side of the mother in the majority of recordings (13 out of 18 recordings in total; 10 out of 12 recordings after 35 weeks) which in Previc's theory should lead to a head orientation preference to the left.

**Figure 1.** Head position preference in spontaneously verted fetuses (n=3)

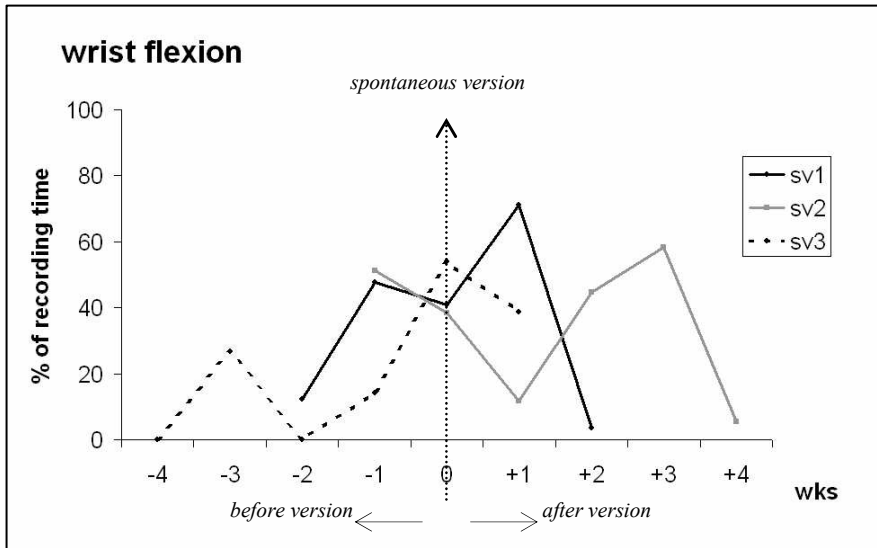


M= middle; R= right; L= left; ----- = 1<sup>st</sup> quartile for head position preference, all dots above this line represent predominant head positions.

### ***Prenatal arm posture***

In our observational study, we found a preference for flexion in elbow, fingers, and wrist in healthy cephalic fetuses in the third trimester of pregnancy. Healthy breech fetuses showed a clear preference for elbow and finger flexion during the final weeks of pregnancy. However, the breech fetuses showed significantly less wrist flexion after 36 weeks gestational age than the cephalic controls [3] (chapter 3 in this thesis). The three SV-fetuses also showed a preference for elbow- and finger flexion throughout the study period.

The data on wrist flexion in this group however show a sharp decrease for two of the three fetuses (SV-1 and SV-2) in the final recordings. For the third fetus (SV-3) a decrease can also be observed albeit less distinct. These findings resemble the wrist posture in our breech group in the weeks before birth. As fetuses SV-1 and SV-3 only turned to cephalic presentation at respectively 36 and 37 weeks, so right before birth, it is quite conceivable that they would show behaviour more closely to that of the breech fetuses.

**Figure 2.** Wrist flexion in spontaneously verted fetuses (n=3)

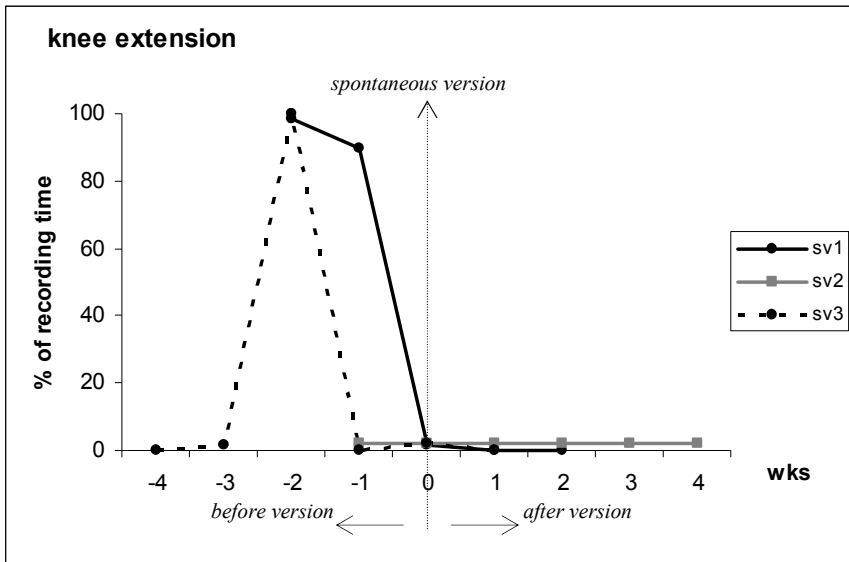
But for fetus SV-2 who already showed version at 34 weeks this would mean a surprisingly prolonged effect of the breech presentation in this aspect of arm posture. Figure 2 shows the data on wrist flexion for the SV-fetuses. To detect possible differences in posture as a result of the version from breech to cephalic presentation, we depict the results relative to the moment of spontaneous version for each fetus.

### ***Prenatal leg posture***

In our observations in the group of breech fetuses we found a clear preference for a leg posture with extended knees when compared to the cephalic fetuses [4] (chapter 4 in this thesis).

Data on knee extension for the SV-fetuses are presented in figure 3. Fetus SV-1 was in frank breech (both knees extended) in both recordings before spontaneous version (at 36 weeks). After spontaneous version a sharp decrease in knee extension could be observed in this fetus. So before version a leg posture comparable to the preference posture in the breech group and thereafter following the cephalic fetuses in this aspect of leg posture.

Figure 3. Knee extension in spontaneously verted fetuses (n=3)



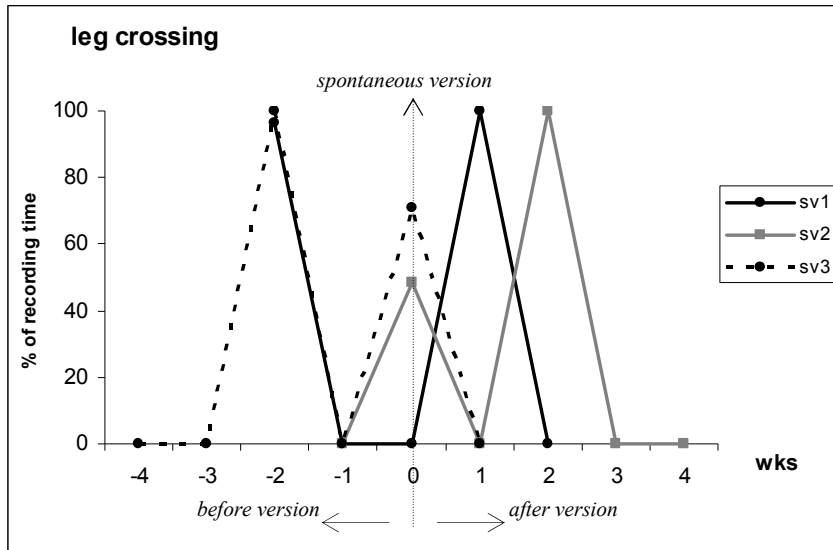
Fetus SV-2 was in complete breech (both knees flexed) in the one recording before spontaneous version. And fetus SV-3 was in complete breech in 2 out of 4 recordings before spontaneous version (at 37 weeks), in one recording there was incomplete breech (with one flexed and one extended knee) and frank breech in the other recording before spontaneous version. So in two of the three SV-fetuses a preference for a leg posture with one or both knees in flexion, before spontaneous version to cephalic presentation. This fits with the previously mentioned article by Westgren et. al.[1]. After version all fetuses exhibit a leg posture with exclusively flexed knees, resembling the findings in the cephalic group.

In our group of cephalic fetuses we found significantly more crossing of the lower part of the legs than the breech fetuses [4].

The data on leg crossing for the SV-fetuses show large intra-individual variation in this aspect of leg posture (fig. 4). No clear trend can be observed for any of the three SV-fetuses. The fact that they changed from crossed to uncrossed leg

postures so frequently could imply more freedom of movement in the hip joint than the fetuses that remained in breech during the study period.

Figure 4. Leg crossing in spontaneously verted fetuses (n=3)



In summary (table 1), the spontaneously verted fetuses in our study, after their change to cephalic presentation, show resemblance with the cephalic fetuses in head preference posture with behaviour in accordance to Previc's left-otholothic dominance theory [5]. For leg posture, in the period before spontaneous version the SV-fetuses exhibited less preference for knee-extension and possibly more leg crossing than the fetuses that remained in breech. After version a clear preference for knee flexion, in accordance to the behaviour in the group of cephalic fetuses. When considering arm posture, the data for wrist flexion after spontaneous version show more resemblance with the breech fetuses. So for two of three studied aspect of prenatal posture the SV-fetuses seem to show adaptation to the prenatal change in intra-uterine environment.



Table 1. Different aspects of prenatal posture, comparison between cephalic, breech and spontaneously verted fetuses

	<i>Breech fetuses</i>	<i>Cephalic fetuses</i>	<i>SV-fetuses after version</i>
Head lateralisation	no clear preference	preference to right	preference to left
Fitting within Previc's theory	-	+	+
Wrist flexion	↓	↑	↓
Knee extension	↑	↓	↓
Leg crossing	↓	↑	variable

Of course our number of SV-fetuses is far too small to draw conclusions about the impact of this change in intra-uterine environment. We believe that nevertheless, this group of fetuses is an interesting group to observe for instance to observe possible determinants for spontaneous cephalic version. Or when trying to understand the aetiology of certain sequelae of breech presentation for instance congenital hip dysplasia and for that matter also the aetiology of persistent breech presentation itself.

## References

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