DECREASE OF FETAL MOVEMENTS (DFM)

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1. INTRODUCTION

• Fetal movements are one of the first signs of fetal vitality and it is important to point out that they appear progressively during pregnancy.
• The adequate acquisition and maintenance of fetal movements during pregnancy are evidence of a correct neuromuscular development, as well as fetal well-being.
• There are several fetal anomalies, such as neuromuscular diseases, central nervous system (CNS) malformations, genetic syndromes, etc., that alter the correct acquisition of the normal pattern of fetal movements.
• The maternal perception of decreased fetal movements (DFM) in a fetus that had acquired them adequately may indicate a loss of fetal well-being.
• DFM is a frequent reason for consultation in emergency services (5-15% in the third trimester of pregnancy). There are several causes of loss of fetal well-being in DFM, including placental insufficiency and fetomaternal haemorrhage.
• Up to 25% of fetuses with DFM will present some perinatal complication (malformations, growth retardation or intrauterine growth restriction (IUGR), premature delivery, fetomaternal haemorrhage, and fetal death) even in low-risk populations.
• Inadequate management of DFM represents 10-15% of preventable deaths at term.

2. NORMAL FETAL MOVEMENTS

• When do they appear?

Fetal movement (FM) is one of the first signs of fetal viability, although it is not detected by the pregnant woman until 18-22 weeks. However, there is great variability: in multiparous women it usually occurs earlier, after 16-18 weeks, while in obese patients it can me postponed to 24 weeks. The non-perception of fetal movements from the 24th week of gestation should be a worrying fact.

• How do fetal movements change throughout the pregnancy?

As the gestation progresses, different movements appear (trunk movements, limbs, respiratory movements, etc.), the 20th week being the moment at which, under normal conditions, all fetal movements have already appeared. As the different movements appear, their intensity also increases, with the maximum intensity being reached after 28 weeks.

From week 34 there is usually an accentuation of the fetal circadian rhythm (episodes of fetal activity with episodes of fetal sleep), so there is an increase in periods of lower maternal perception of fetal activity. This situation must be differentiated from a decrease in fetal movements of pathological significance. In the accentuation of the circadian rhythm, episodes of fetal sleep alternate with episodes of vigorous fetal movement of adequate duration throughout the day.

• Factors that interfere with maternal perception of fetal movements:

There are certain situations/circumstances that can alter the maternal perception of fetal movements. We will differentiate those that are associated with a loss of fetal well-being (High-risk factors) from those that do not increase the risk of loss of fetal well-being (Low-risk factors). It will be important to inform all pregnant women of all these factors, and specifically pregnant women with DFM.

- **High risk:** There are certain risk factors or situations that have been associated with an increased risk of antepartum fetal death and Fetal growth restriction (FGR), probably secondary to episodes of fetal hypoxia:
    - smoking habit
    - alcohol intake
    - sleeping in the supine position, especially in the third trimester of pregnancy

- **Low risk:** There are other situations that have been associated with a decrease in maternal perception of fetal movements WITHOUT indicating a situation of fetal risk, such as:
    - intake of sedative or antidepressant medication
    - maternal stress
    - long periods of supine position or significant physical activity
    - prolonged fasting

3. FETAL MOVEMENTS AS AN ANTENATAL WELL-BEING TOOL

All pregnant women without prior training are able to describe fetal movements throughout pregnancy. However, many of them are unaware of its true meaning. The correct provision of information about

DFM to pregnant women has been shown, in observational series, to reduce the percentage of perinatal complications.

With this aim, pregnant women should receive information on "Fetal Movements" (Annex 1) at 19-23 weeks, at the moment of the second-trimester screening ultrasound. In this information sheet, the normal pattern of fetal movements is explained to them, simple recommendations related to fetal movements are given, and alarm signs are specified for which assistance in a hospital centre is recommended for the evaluation of the DFM:

- No perception of fetal movements > 24 weeks
- Total absence of movement that lasts >2 hours (do not wait more than 24 hours)
- Decreased habitual perception of fetal movements lasting >12 hours (do not wait more than 24 hours)
- If in doubt, perform directed counting and check if <10 movements in 2 hours at some time of the day when the fetus is normally active (after meals + left lateral decubitus)

4. DIAGNOSTIC TESTS BEFORE DFM EPISODE

Although there is no consensus on the antenatal control to be carried out when there is an episode of DFM, it is recommended to carry out a general anamnesis aimed at ruling out confounding factors, then assess fetal well-being, and finally try to clarify the cause of the DFM by ultrasound evaluation.

4.1 General history

• Duration of the DFM episode (decrease or absence of FM) and associated symptoms (metrorrhagia, hydrorrhea, uterine tone).

• Rule out possible associated confounding factors: type of maternal activity, position, fasting, smoking habit, intake of sedative drugs, maternal anxiety and stress.

4.2 Assessment of fetal well-being:

• **Non-stress** cardiotocography **(CTG):** Constitutes the first step in the detection of fetal hypoxia. It should be performed from 28 weeks. This should be considered 'reassuring' as long as it meets the criteria (≥2 transient accelerations of >10-15 bpm above baseline for >15 seconds in 40 minutes; in < 32 GA: accelerations of >10 bpm in >10 seconds). It will be taken into account that between 28-32 weeks up to 15% of the records are non-reactive (detailed in the *Antepartum fetal well-being chapter*). In suspicious CTG cases (non-reactive or with low variability) or in pathological cases where completion is not the first option (due to gestational age (GA), for example), a fetal biophysical profile (FBP) should be performed (see next section). • **Complete FBP:** Due to its low positive predictive value, it should only be used in non-reactive or pathological CTG where induction of labour is not the first option. On the other hand, its performance should also be indicated when fetal movements are not observed during the

ultrasound (see next section). It consists of the assessment of 5 fetal parameters for 30 minutes. The normality of each of the parameters adds 2 points:

- Respiratory movements: ≥ 1 episode lasting more than 20 seconds
- Fetal movements: ≥ 2 movements of the limbs or trunk
- Fetal tone: ≥ 1 episode of extension-flexion of the trunk or limbs or opening and closing of the hands
- Amniotic fluid: maximum column of amniotic fluid ≥ 2 cm
- Non-Stress Test (NST): reactive fetal pattern without decelerations

4.3 Study of the cause of DFM by ultrasound:

• **Estimated fetal weight (EFW):** update EFW if last determination was > 2 weeks

• **Maximum vertical column of amniotic fluid (MCV):** rule out oligohydramnios (< 2 cm) or polyhydramnios (> 8 cm).

• **Screening for fetal malformation:** it will be verified that the patient underwent the second or third trimester screening ultrasound with normality or that it has already been scheduled. If this is not the case, and if there are no other warning signs, the attendance report should indicate that they must do so (at their reference centre).

• **Fetal movements:** during the ultrasound, the presence of fetal movements should be documented. If absent, a full FBP should be performed.

• **Fetal Doppler study of the middle cerebral artery (MCA):**

- Cerebroplacental Ratio (CPR): Given the current evidence of the role of CPR (middle cerebral artery pulsatility index (MCA PI) / Umbilical artery pulsatility index (UAPI)) in the diagnosis of fetal hypoxemia, even in fetuses with adequate fetal growth, it will be routinely performed in DFM. It will be considered normal if CPR > p5 or signs of fetal hemodynamic redistribution if CPR <p5 (see: https://medicinafetalbarcelona.org/calc/).

- Peak systolic MCA (PSV MCA): the evaluation of PSC MCA will be carried out systematically in all patients with DFM, given its association with Fetomaternal Haemorrhage (FMH). FMH is a potentially severe condition for the fetus, and, in a not insignificant percentage of cases, it occurs inlow-risk pregnancies. Severe cases of FMH will generally be accompanied by alterations at the CTG level (sinusoidal rhythm, decelerations, etc.), although less severe cases may present with less evident alterations at the CTG level (limit variability, non-reactive pattern, etc.). It should be considered normal if PVS MCA <1.5 MoM according to gestational age, or fetal anaemia is suspected if PVS MCA >1.5 MoM (see: https://medicinafetalbarcelona.org/calc/).

5. MANAGEMENT OF THE DFM ACCORDING TO THE RESULTS OF THE TESTS

5.2 IF THE PERFORMED TESTS ARE NORMAL

Patient can be discharged, reminding her of the DFM alarm signs (i.e. giving the information sheet in Annex 1) and scheduling a follow-up appointment if necessary. This will be carried out according to whether they are low or high-risk patients:

- Low-risk pregnant women with a first episode of DFM: regular obstetric checkups should be proposed.
- High-risk pregnant women (detailed in Annex 2). One additional fetal well-being checkup should be carried out within 48-72h, including CTG + ultrasound assessment. Depending on the results:
    - If everything is normal: no additional follow-up
    - If everything is normal, but the maternal perception of DFM persists: schedule another appointment within 2 weeks in the Well-being unit. Depending on the findings, schedule periodic checkups or refer to usual care
    - If any abnormality in the test: see the next section

5.1 IF ABNORMALITY IN ANY OF THE TESTS CARRIED OUT:

If any type of alteration is detected in the tests carried out:

- Alteration in the evaluation of fetal well-being (CTG and/or FBP): see chapter Antepartum fetal surveillance

- Ultrasound abnormality:
    - EFW <10th centile: transfer to FGR unit
    - Amniotic fluid alteration or CPR alteration: transfer the patient to the fetal well-being unit.
    - Suspected malformation: transfer the patient to a Fetal Medicine Unit.
    - Suspected fetal anaemia (PSV MCA > 1.5 MoM): a battery of studies of causes of fetal anaemia will be requested, which will include: irregular antibody test, Kleihauer-Betke study or flow cytometry, and serological study of congenital infections that can present with fetal anaemia (CMV and PVB19 IgG and IgM; Lues reaginic and treponemal tests) and a visit to the Fetal Haematology Unit will be scheduled in 48-72h for follow-up.

      If a high percentage of fetal red blood cells (or fetal haemoglobin) is detected in maternal blood by the Kleihauer test or flow cytometry, the total volume of transfused fetal blood will be quantified. The estimation of the volume of transfused fetal blood will be carried out using formulas, of which we highlight the following:

        O Kleihauer Formula: (Maternal Hct/Fetal Hct) x % fetal cells (fetal Hb) x maternal volume (estimated 5800 ml).

        o Creasy Formula: % fetal cells (fetal Hb) x maternal volume (estimated 5000 ml).

      Although there is no consensus, a significant intrauterine transfusion will be considered if there is a loss of fetal blood volume >20 ml/kg (which usually corresponds to about 50 ml). Remember to adjust the anti-D gammaglobulin dose in Rh-negative patients (see Alloimmunisation in pregnancy chapter).

6. INDUCTION OF LABOUR

Depending on the results of the tests, the gestational age and the presence or absence of the specified risk factors, we can propose:

- **Induction at 41 weeks of gestation**: indicated in patients with a single episode of DFM, with normality in all tests and without presenting additional risk factors, since it is likely that the absolute risk of fetal death is <1%.
- **Induction at 39 weeks of gestation**: indicated in those patients with a single and recent episode of DFM, with normal tests, but presenting additional risk factors according to Annex 2.
- **Induction at 37 weeks of gestation or earlier** according to clinical criteria: indicated in that subgroup of patients with persistence of DFM (>=2 episodes of DFM), even with normality in all tests, or when the DFM is associated with some alteration in the level of the Doppler study, alteration in the amount of amniotic fluid, fetal weight (EFW <10th centile) or alteration at the level of fetal well-being check-up.

If performing an induction of labour because of DFM, the placenta should be sent to the Pathological Anatomy service for study.

Annex 1: Information sheet "Fetal movements"

WHEN WILL I START TO NOTICE FETAL MOVEMENTS?

Fetal movement is one of the first signs of fetal life, although they are not usually noticed by the mother before 18 weeks. If you have already been pregnant, you may start to notice them earlier, or later in obese patients.

ARE FETAL MOVEMENTS ALWAYS THE SAME?

Under normal conditions, at 20 weeks of gestation all fetal movements have already appeared and, from then on, they increase in intensity until week 28, when their intensity is maximum. Subsequently, due to an accentuation of the fetal sleep period, you may feel that the movements decrease.

DO ALL FETUSES MOVE THE SAME WAY?

Every fetus' movements are unique, not only in intensity but also in the pattern of movements. Every baby is different in how they move, and there is no ideal movement pattern. The important thing is that their level of activity remains stable, to know that everything is most likely going well.

CAN I DO SOMETHING TO ENHANCE FETAL MOVEMENTS?

Smoking, alcohol intake and sleeping, especially in the third trimester in a supine position (face up), are related to a decrease of the amount of blood that reaches the baby. Smoking cessation, alcohol avoidance and sleeping on the left side (putting a pillow behind your back) has been linked to an improvement in the amount of blood reaching the baby and therefore has been linked to an increase in fetal movements.

On the other hand, there are different situations that can decrease the perception you have about fetal movements without indicating any problem in the baby, such as: the intake of some sedative or antidepressant medication, maternal stress, long periods of standing or doing significant physical activity and prolonged fasting.

WHEN SHOULD I CONSULT?

Under normal conditions, at 24 weeks you should be able to perceive your baby's movements. If you have reached 24 weeks of gestation and do not perceive any movement, you should consult to your doctor. If you have already noticed the movements but perceive a change in the habitual pattern of your baby's movements, it is also recommended to consult. At most, it is advisable not to delay the consultation beyond 12 hours if you notice a decrease in movements, and no more than 2 hours if you notice a complete absence of movements. If there are doubts, it is recommended to carry out a directed count of the number of movements that the baby presents and check if you count less than 10 movements during the two hours after meals. It is also advisable to lay down on your left side to increase fetal blood input.

Annex 2: Risk factors (adapted from "Protocol de seguiment de l'embaràs a Catalunya, 2018")

HYPERTENSION	Hypertensive disorders
	Pregnancy-related hypertensive disorders
THROMBOPHILIA	
MATERNAL PREVIOUS CONDITION	CHRONIC RENAL DISEASE
	CARDIOVASCULAR DISEASE
	ENDOCRINOLOGY DISEASE
	AUTOIMMUNE DISEASE
INFECTIOUS DISEASE	
OBESITY: BMI>30	
TOXIC HABITS	CIGARETTES, CANNABIS
	ENDOVENOUS DRUGS
	OTHER TOXICS
ETHNICITY	BLACK ETHNICITY
MATERNAL AGE	< 18 YEARS
	> 38 YEARS
FETAL GROWTH RESTRICTION	
ULTRASOUND MALFORMATION	FETAL MALFORMATION
	ANOMALOUS UMBILICAL CORD INSERTION
	ANOMALY IN PLACENTA INSERTION
	ABNORMAL DOPPLER (including uterine arteries > p95)
FETAL IMMUNISATION OR FETAL HYDROPS	
PAST OBSTETRIC COMPLICATIONS	PREVIOUS STILLBIRTH
	PERINATAL DEATH
TWIN PREGNANCY	
PREVIOUS ABDOMINAL TRAUMA	
PREGNANCY WITHOUT ANTENATAL CHECKUPS	

INFORMATION SHEET 19-23 s

NORMAL PATTERN OF FETAL MOVEMENTS:

• Expected start of perception of movements: >22s in primiparous women and >18s in multiparous women (in obese women up to 24s)

• Appearance of the entire range of movements: 20-22s

• Evolution of the movements: maximum around 28 weeks, subsequently an increase in fetal sleep episodes, although the intensity and strength of the movements increases until 40-41 weeks.

• Recommend in patients with DFM: sleep in left lateral decubitus (LLD) (put a pillow on the back) and insist on giving up alcohol and tobacco

• Possible confounding factors (type of maternal activity and position, prolonged fasting, intake of sedative drugs, maternal anxiety and stress).

ALARM SIGNS:

• No perception of fetal movements > 24 weeks

• Total absence of movement that lasts >2 hours (do not wait more than 24 hours)

• Decreased habitual perception of fetal movements lasting >12 hours (do not wait more than 24 hours)

• If in doubt, perform directed counting and check if < 10 movements in 2 hours at any time of the day that the fetus is normally active (after meals + lying on the left side)

ALGORITHM