PERIOPERATIVE MANAGEMENT OF THE OBESE PREGNANT PATIENT

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SUMMARY

The authors take into consideration obesity during pregnancy and they analyze the advantages of an optimum perioperative management after having made some physio-pathological notes. They dwell on the importance of the patient’s position, the contribution of oxygen during delivery, monitoring and adequate equipment and also on the most used techniques for caesarean section.

They conclude affirming that the pregnant women, even more so if she is obese, is exposed to greater risks as a result of episodes of hypoxia, hypercarbia and pulmonary hypertension.

Key words: Obesity, pregnant, pre-oxygenating, anaesthesiological risk, preoperative management

Introduction

In obesity the increase in body fat is usually due to an increase in the number of calories taken compared to consumption. Only in a small percentage of patients obesity is caused by some neurological endocrine diseases such as hypothyroidism, hypothalamic lesions, hypogonadism, insulinomas, adipose genital dystrophy, partial lipodystrophy, polycystic ovaries, Cushing Syndrome. BMI (Body Mass Index) is commonly used to define obesity. Body Mass Index (BMI) is an index of the body state in anthropometric terms which correlates height to weight of the subject and is measured by dividing weight in kilograms by height in metres squared. BMI - Calculation Body Mass Index = weight (Kg)/height2 (meters).

Such index of body mass is simple to calculate but it does not give a precise indication of the amount of fat mass of the subject, that can only be obtained by anthropometrical analysis, executed with an impedencometric balance, with calipers or hydrostatic weighing.

The calculation of the BMI proves valid above all in the definition of situations where there is a cardiovascular risk, since it is introduced in formulae or tables, or in order to calculate the value of the ideal weight in subjects with a "normal" musculature, for which the calculation of the ideal weight with the BMI allows for an error which does not exceed 2 kg (in excess or defect).

Physiopathology

Obesity amplifies, in proportion to weight increase, the physiological modifications supported by the cardiovascular, respiratory and gastrointestinal systems.

In the cardiovascular system we can note:

• an increase of 43% in the cardiac range (1,5l/min) from 4,3l/min. to 6,2l/min with a peak around the 24th week of gestation. The first phase of the pregnancy determines an increase in the systolic range (+25-30%) and successively there is an increase of the cardiac frequency (+15b/min).

From the 20th week of gestation the cardiac range is influenced by the position of the pregnant woman (reduction of the range in supine position caused by the compression of uterus on the venae cavae).
The elevation of the diaphragm determines a change of position to the left of the heart with changes in the ECG (derangement to the left of the cardiac axis, reversible changes in the T and Q wave and in the ST trait.

- an increase in plasmatic volume of 35-40% (100-1500ml) in comparison to pre-pregnant levels, with an increase of 30% in red cell mass: this explains physiological anaemia during pregnancy (HB levels of about 11g/dl).

In the respiratory system there is a significant change in respiratory physiology.

In fact obese patients show a reduction in the functional residual ability and, apart from the pulmonary residual volume, all pulmonary volumes (vital capacity, total pulmonary capacity) are reduced.

Moreover in proportion to obesity, there is a reduction of $\text{PaO}_2$ and of the compliance of the thoracic wall with the lung. In obesity total compliance is decreased, on average, by about 50%.

Respiratory alterations in obese patients, during pregnancy, cause an increase of about three times in respiratory labour. The increase in body mass causes an increase in the consumption of oxygen and in the production of CO$_2$ which would require an increase in the minute ventilations which is not always bearable given the body mass. The increase in volume of the abdomen reduces the movements of the diaphragm, especially in the supine position and Trendeleburg, further hindering ventilation. Alterations in the cardiopulmonary function are schematized in table 1.

**In gastrointestinal systems** of obese patients there is a major prevalence of hiatus hernia with a delay in gastric evacuation. On a full stomach the gastric content is of at least 25ml with a pH inferior to 2.5.

For this reason pregnant obese patients should always be considered to have a full stomach with a very high risk of aspiration. For this purpose in the case of surgery an antacid and an anti H2 should always be administered.

**Perioperative Management**

The obese patient must be considered as a potential patient with multi-organ illness.

The possibility of an urgent surgical procedure or in the case of an emergency, on a pregnant patient weighing over 120kg is more than 30%.

The semi-seated or lateral position during labour and during delivery improve pulmonary compliance and minimize cardiovascular stress. In this position, the adipose cushion places itself outside the abdominal cavity and so it reduces intra-abdominal pressure with greater diaphragm range. The contribution of oxygen is also useful during labour and delivery to increase the margin of security.

The supine position should be absolutely banned even during a caesarean section. A caesarean section can be calmly performed raising the patient’s shoulders at least 40-45° by placing an ordinary pillow underneath the shoulders.

Monitoring the obese patient can be more difficult due to her objective conditions (difficult vein approach) and due to the lack of equipment adequate for the patient’s dimensions (e.g. armband to monitor blood pressure).
On the market there are different size arm-bands available to measure blood pressure.

This equipment must always be available in the operating complex of the delivery room. In any case blood pressure must always be monitored and all in all, in case of difficulty, the radial artery can be “Incannulata” to monitor blood pressure.

This type of monitoring must always be available in the delivery room in order to be promptly used in the case of complications such as haemorrhage, cardiac or and the respiratory insufficiency. Up to today the most common techniques used for caesarean section are the epidural anaesthesia and the upper spinal anaesthesia without omitting the possibility, in certain cases, of general anaesthesia. One continues with field block anaesthesia (epidural, spinal-epidural) which is undoubtedly the most effective analgesic treatment.

The central neuro-axial blocking, correctly performed, significantly reduces the neuro-endocrine sympathetic-adrenergic response to pain. It determines greater stability of the hemodynamic parameters, it improves the uterine-placental blood flow and as a result, improves the foetal outcome. Moreover it prevents hyperventilation and the consequent hypocarbia that can result in vasoconstriction and a reduction of the uterine-placental haematic flow. The reduction of respiratory labour and of the consumption of oxygen prevents maternal lactic acidosis.

An additional advantage in terms of security of anaesthetic techniques applied to the obstetric population is represented by the minor resort to general anaesthesia in the case of urgent caesarean section in patients with the epidural catheter positioned for the analgesia during labour.

In fact in high risk patients who are obese or are suffering from pre-eclampsia, the epidural catheter should be positioned precociously therefore reducing the possibility of having to resort to general anaesthesia in an emergency as these patients run a very high risk of being operated.

As regards the technique, it should be considered that the epidural space as the subarachnoid space can result more difficult in obese patients.

General anaesthesia should be reserved for where local anaesthesia could be contraindicated. In obese patients the incidence of difficult intubation is 33% in the case of c-section in comparison to an incidence of 13% in obese patients for general surgery. As a result of a reduction in functional residual capacity, the more obese the pregnant patient is, the more at risk of episodes of hypoxia which together with hypercarbia can cause unexpected pulmonary hypertension an cardiac arrhythmia.

Seeing the high incidence of aspiration, an antacid (30ml) should be administered orally 30 minutes before the operation and an anti H2 into the bloodstream(cimetidine or ranitidine). Pre-oxygenating is highly recommended for at least 3 minutes before induction of the general anaesthesia.

The use of the capnograph and of the pulse oximetre in the operating theatre is imperative as well as the routine ECG and blood pressure monitoring. Finally it is necessary to effectively treat postoperative pain at the end to minimize hypoxentilation due to pain.

Conclusions

An anaesthesiological plan is essential in order to optimise the management of the obese patient in pregnancy including the pre-operating anaesthesiological assessment. During the pre-op visit, particular attention should be paid to the approach to the airways and to the cardio-respiratory functions (anamnesis, objective and useful).

Moreover the patient should be adequately informed about the anaesthetic technique with particular attention paid to local anaesthesia, underlining the countless advantages of this technique in comparison to general anaesthesia, but also preparing the patient for eventual possible difficulties in the carrying out of field block anaesthesia.

An adequate pre-op preparation must also contribute to the reduction of pre-op anxiety in order to increase the patient’s compliance during the execution of field block anaesthesia and in the final analysis increase the percentage of success of the technique.

Discussion

The execution of the spinal anaesthesia for caesarean section in the obese patient is often investigative as regards the norm. Some technical shrewdness and the correct use of material can in these cases facilitate the carrying out of spinal anaesthesia.

References


