

The morbidly obese parturient: myths versus facts

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Abstract

More patients present nowadays with extreme overweight. Whereas the choice of the best anaesthesia technique may be a challenging dilemma and affected by the several risks, some of these risks are overstated.

Fear to perform regional anesthesia in the morbidly obese may be ungrounded. Performing neuraxial analgesia or anaesthesia in the sitting position may offer more optimal conditions. The patient may help to guide the needle to a midline plane. Needles rarely need to be longer than in the non-obese. Accidental taps are not necessarily more frequent while resulting in less Post Dural Puncture Headache (PDPH). It may be wise to place epidural catheters as soon as possible during labour as catheters sometimes require replacement and because of their benefit in case of a rather frequent conversion to a C-section.

Also the risk of failed intubation in the obese patient seems to be overemphasized. However, in all cases, the anaesthetist should be prepared having (difficult) intubation equipment ready. Pre-delivery screening for diabetes, hypertension and intubating anatomy may also help to anticipate possible problems.

Keywords: obesity, general anaesthesia, regional anaesthesia, Caesarean, intubation, failure

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Introduction

The morbidly obese patient and more particularly the extremely obese parturient may signify a major challenge for the anaesthesiologist. Progressively more patients present nowadays with extreme overweight with an additional trend of being older than some decades ago.

The present overview will focus on fears, myths and facts anaesthesiologists are faced with when dealing with such pathology.

Definition of overweight

When it is commonly accepted that a body mass index (BMI) > 30 kg/m² is considered to be 'obese' and > 35 to be morbidly obese, for parturients this may need some reconsideration. While in the UK almost 20% of women in their childbearing ages seem to be obese (in the period 2003-2005), around 50% of maternal deaths were patients with overweight or obesity while 15% were even morbidly or super obese. All patients dying from a direct anaesthetic cause were obese or morbidly obese [1]. The mean increase in BMI during pregnancy is approximately 5 kg/m². If therefore a BMI > 30 would be considered to be obese for pregnant patients then > 50% of the US and UK parturients would fulfill these criteria nowadays. Based on this it may be suggested to adopt the definition of morbidly obese parturient to a BMI value as starting from 40 kg/m².

Women should be weighed before delivering a neonate because they and anesthetists even more

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seem to underestimate body weight. As opposed to common belief, obese parturients do have equal or even somewhat less increases in BMI than non-obese counterparts [2, 3].

What are the risks?

It can not be ignored that morbid obesity includes several maternal and neonatal risks affecting morbidity and mortality [4, 5]. The mother may suffer cardiac disease due to afterload increase, left ventricular hypertrophy, pulmonary hypertension, coronary artery disease and peripartum cardiomyopathy. The presence of Obstructive Sleep Apnoea syndrome may further accentuate pulmonary hypertension due to chronic hypoxia and hypercapnia. Due to lower lung capacities and residual volumes the patients rapidly become hypoxic. Diabetes type 1 and 2 are possible and should be part of a screening process. Obese patients may suffer more frequently gestational hypertension, preeclampsia and thrombo-embolic disease [6-8]. Morbidly obese patients may be at risk for infection such as urinary tract infections, endometritis and wound infection/disruption. Due to increased intra-abdominal mass there may be more aortocaval compression. Labours tend to be longer often requiring conversion to Caesarean section [6, 9]. Trauma and bleeding are more likely to occur. Thromboprophylaxis is absolutely mandatory. Patients having undergone bariatric surgery may have vitamin deficiencies, such as vit K and vit B12 and may suffer peripheral neuropathy being more susceptible to compression when weight and fat loss has been considerable [5]. Technical problems may occur more frequently. Also the neonate may suffer from maternal obesity. Macrosomia, congenital defects, dystocia (shoulder), instrumental delivery and longer intervals between uterine incision and delivery are among the most important problems affecting the neonate. At adult age they seem to be more susceptible to become obese as well.

Technical difficulty

For both the obstetrician and anaesthesiologist obesity may signify considerable technical problems. The obstetrician will need more operation time while intervals between incision and delivery may be prolonged. More blood loss may be anticipated. Fetal monitoring may be difficult. The anaesthetist may experience difficulty in finding the appropriate cuff for blood pressure monitoring. Vascular access will be difficult either. Mask ventilation and intubation may sometimes be a serious challenge. As, to start with, the landmarks may not be found very easily, successes at first attempt have been reported to be as low as 42% [10] to find

the epidural or intrathecal space while more than 10% may require more than 3 attempts, with more complete failures, and need for supplementation proportional to increasing BMI [9-13].

Catheters may be displaced more easily often requiring replacement. Special equipment may be required sometimes for intubation and regional anaesthesia techniques. Due to fat and soft tissue and the lack of clear bony landmarks there may be a false positive loss of resistance feeling but mostly catheters may not be placed uneventfully in this situation. The sitting position may be the best for the morbidly obese patient as the puncture area will not be covered by fatty pads. In addition this position may reduce the rostral spread of the epidural injectate. On the other hand the pressure upon the dura (bulging) and epidural veins may cause more accidental taps of blood or cerebro spinal fluid (CSF). In case of a dural tap causing PDPH, the desirability to perform an epidural blood patch (EBP) may face the anaesthetist twice with the same anatomical problem.

Myths and facts about regional anaesthesia

Which is the best technique?

Theoretically all regional techniques are feasible for labour analgesia and C-section anaesthesia. For labour analgesia both an epidural and combined spinal epidural (CSE) will ensure good analgesia. Care should be taken to keep the opioid doses as low as possible.

For a C-section a single dose spinal (SDS) may induce less predictable and titratable blocks.

To ensure a 100% success rate one would tend to give a large enough dose although in the morbidly obese this may be problematic as it is commonly believed that blocks tend to spread more extensively in the obese than the non-obese when not reducing the local anaesthetic dose. To be able to titrate the neuraxial block either epidural, CSE or CSA techniques are possible. Whereas the extended use of an epidural catheter may be a logical solution when already present during labour, a CSE technique may be the best option actually.

Successful puncture of the dura may signify a fair midline approach. Although not a common belief of those experienced in CSE techniques, some studies have shown more successful epidural function after CSE than when placed as plain epidurals as evidenced by less need for replacement, less unilateral blocks or lack of sensory changes [14, 15].

In obese patients this may be even more realistic to accept. As the epidural space is located more deeply in the obese patient, a small deviation from the midline may signify a larger distance in the lateral direction than in the non-obese, once the epidural space is entered. When being more lateral with the epidural needle

orifice, introducing the spinal needle may be more likely to fail to penetrate the dura when compared with non-obese conditions.

More or less local anaesthetic?

Several studies, mostly from the previous century, have shown that obese patients need less local anaesthetic during spinal [16-18] and epidural [19, 20] anaesthesia. For spinal anaesthesia the reduced local anaesthetic dose is explained by lower amounts of CSF in the pregnant patient. However most studies have used rather high doses when plain solutions were injected which spread differently and more freely than hyperbaric substances. Pitkänen demonstrated that higher spread on obese patients only accounts for plain solutions while for hyperbaric bupivacaine this was only the case in patients with shorter height than normal individuals [18].

In a CSE study using the BD-Adjustable combination, Hoffmann et al [21] have been able to show that the more obese the larger the epidural space width (ESW), most probably because of more fat deposition and venous distention. How this translates to the space available for local anaesthetic spread is more unclear than for spinal anaesthesia. More fat and vascular distention may also signify more systemic resorption and deposition of drug substance in fat, thus requiring rather larger dosing. Recent studies and case reports, even using 15 mg bupivacaine in a patient with a BMI of 45 kg/m² [22] have demonstrated that the use of regular dose of hyperbaric bupivacaine is safe and that recalculating the dose based upon actual or ideal weight is unnecessary [23, 24].

More risk of dural tap and PDPH?

Also CSA may be an option as placement of an intrathecal catheter with CSF aspiration control may guarantee a successful spinal anaesthetic technique allowing to titrate the dose until a satisfactory spread is obtained. Despite successful cases there is still a high mortality risk regardless of the technique used [25, 26]. Some may fear that PDPH may be more likely and that performing an epidural blood patch may face the practitioner with similar technical difficulty and dural tap risk as during delivery. It has been shown, and fortunately so, that the more obese the less likely the occurrence of PDPH [27]. In addition, as the ESW is larger in the obese and the epidural space depth may be overestimated (by exerting too much pressure on the ultrasound probe) the safety margin before an accidental tap may also be larger.

Is special equipment mandatory?

As there may be a need for larger equipment when intending a neuraxial block, anaesthetists may consider general anaesthesia when this equipment might not be available. However it has been shown that with BMI values up to 45, 50% of parturients do have an epidural

space depth of less than 7 cm whereas another 25% may be helped with 9 cm epidural needles (as available in the CSE trays of most companies) [28]. It should be remembered that this is not the case when intending a SDS with a 9 cm useful length when using small pencilpoint needles as these needles will have orifices more proximally and will need an introducer preventing full introduction of the spinal needle for another 1-2 cm.

May ultrasound offer the final solution?

Ultrasound (US) has been used successfully in obstetric anaesthesia but is a nice adjuvant only in the hands of the experienced [29]. In our department we have been able to perform successful neuraxial blocks for C-section on patients with previous Harrington fusion [30] and super-obese patients. When the anaesthetist is not familiar with US then the apparatus will not be of any help in case of difficult landmark finding in the morbidly obese. In addition there are more problems than anticipated. Ultrasound in the pregnant, obese or not, is not as easy as in the non-pregnant female. As opposed to peripheral nerve blocks where one person can do the block and the ultrasound, real time US in neuraxial blocks is more difficult because the anaesthetist needs both hands to perform the loss of resistance technique. US may only help then to find the midline and puncturing place unless a second person will handle the US probe taking care that sterile conditions are preserved. US of the back needs a convex probe. Pushing the probe more deeply to see the bony landmarks and structures may lead to underestimation of the ESD which fortunately may be less dangerous than an overestimation. In times when US was not available, the patient helped us in guiding the position and direction of the epidural needle.

Myths and facts about general anaesthesia

More intubation problems?

It is commonly accepted that pregnant patients are more difficult to intubate [31]. A distinction should be made between difficult mask ventilation, difficult laryngoscopy and difficult placement of the endotracheal tube. Despite some difficulty to assist the patient or have an optimal view of the vocal cords, this does not necessarily signify failed oxygenation or intubation failure. In the pregnant population the incidence of difficult intubation is as high as 1 in 280 intubations as opposed to 1 in more than 2000 for the non-pregnant females. However some authors even doubt that parturients are more difficult to intubate than gynaecological patients [32]. In the additional case of obesity reported incidences vary from 1 in 238 (which is slightly more than the 1:280 accepted for parturients in general) to 15% while some even found it to be as high as 33%

[10, 31, 33]. Based on a study in our department on 2000 intubations in non-pregnant patients of whom over 300 had a BMI > 30, the incidence of a difficult intubation score was 16% versus the incidence of 10% in patients with BMI < 30 [34]. The Mallampati score 3-4 was a better indicator for difficult intubation being eight times more difficult in the obese subjects. Due to this we believe that fear for intubation problems is overemphasized. This is also supported by large series reported in literature where in > 90 000 patients the odds ratio for difficult intubation in patients with BMI > 35 was found to be only 1.34 [35]. In another study only the Mallampati score 3-4, previous radiation therapy, male sex and sleep apnoea were independent risks for difficult intubation while mouth opening and BMI were not [36]. As opposed to this others found that none of the usual predictors were of practical benefit in assessing the risk of failed intubation in the obese [37].

However it should be emphasized that in studies comparing the obese versus the non-obese patient, regardless of a retro- or prospective design, reassuring results may be due to a publication bias as anaesthetists will be better prepared nowadays when faced with obese patients while intubation will not be left in the hands of a less experienced resident.

More risk of pulmonary aspiration?

Pregnant patients may never be considered to have an empty stomach. Aspiration of gastric content and the risk for pulmonary damage depends on acidity and volume of the gastric content.

Several studies found that in the obese there is no reason to believe that both parameters would be different as compared to the non-obese population or that gastric emptying would be more delayed in the obese [38, 39]. The amount of allowed intake will not affect residual volume and pH either. On the other hand the anaesthetist should be aware that other factors may play a role in the obese such as the presence of a hiatal hernia, reflux and diabetes (affecting gastric emptying due to polyneuropathy). Mask ventilation (if applied) may be more difficult while gastric insufflation may increase the risk of regurgitation of gastric content. Prophylaxis remains absolutely crucial.

Conclusion

Fear to perform regional anaesthesia in the morbidly obese may be ungrounded. When performing neuraxial analgesia or anaesthesia the sitting position may offer the most optimal conditions. The patients may help to guide the needle to a midline plane. Needles rarely need to be longer than in the non-obese. This does not signify that anaesthetists should not be prepared to convert to general anaesthesia, having (difficult)

intubation equipment ready. Pre-delivery screening for diabetes, hypertension and intubation anatomy may also help to anticipate possible problems.

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Parturienta cu obezitate morbidă: mituri și fapte

Rezumat

Tot mai mulți pacienți se prezintă astăzi cu supra-greutate extremă. În această situație, alegerea celei mai bune tehnici anestezice poate constitui o provocare afectată de mai multe riscuri, unele din aceste riscuri fiind supraevaluate.

Teama de a efectua o anestezie regională la obezul morbid poate fi nefondată. Efectuarea analgeziei sau anesteziei neuraxiale în poziție șezândă poate oferi condiții optime. Pacientul poate ajuta la ghidarea acului în planul liniei mediene. Rareori este nevoie ca acele să fie mai lungi decât la pacientul neobez. Puncțiile accidentale ale durei mater nu sunt mai frecvente și produc mai rar cefalee post puncție durală. Ar fi de dorit ca plasarea cateterelor epidurale în cursul nașterii să se efectueze cât mai devreme posibil, întrucât cateterul trebuie uneori înlocuit și sunt de folos în cazul în care, destul de frecvent, se impune conversia la secțiunea cezariană.

De asemenea, se pare că și riscul de intubație eșuată la pacientul obez este supraevaluat. Totuși, în toate cazurile, anestezistul trebuie să fie pregătit având echipamentul de intubație (dificilă) la îndemână. O evaluare anterioară nașterii pentru diabet, hipertensiune și anatomia intubației poate ajuta de asemenea anticiparea unor posibile probleme.

Cuvinte cheie: obezitate, anestezie generală, anestezie regională, cezariană, intubație, eșec