

Practice of Obstetric Analgesia in Maternity of Kinshasa City

Papy B. Ibobondji², Alphonse N. Mosolo^{1,2}, Wilfrid D. Mbombo^{1,2*}, Freddy M. Mbuyi^{1,2}, Aliocha N. Nkodila³, Serge M. Mukendi³, Céline B. Tendobi⁴, Hervé N. Musubao⁴, Rémy B. Kashala⁵, Patricia T. Kabuni², Jean Pierre M. Ilunga², Médard I. Bulabula², Berthe N. Barhayiga² and Adolphe M. Kilembe²

¹Monkole Hospital Center/Anesthesia Resuscitation Department.

²University of Kinshasa/Department of Anesthesia Resuscitation.

³Independent, ⁴Monkole Hospital Center/Obstetrics Department.

⁵Monkole Hospital Center/Medical Department.

***Correspondence:**

Wilfrid D. Mbombo, Monkole Hospital Center/Anesthesia Resuscitation Department.

Received: 10 Jul 2023; Accepted: 13 Aug 2023; Published: 19 Aug 2023

Citation: Ibobondji PB, Mosolo AN, Mbombo WD, et al. Practice of Obstetric Analgesia in Maternity of Kinshasa City. J Med - Clin Res & Rev. 2023; 7(8): 1-6.

ABSTRACT

Objective: The study was carried out to make an inventory of the practice of obstetrical analgesia in Kinshasa's maternities.

Methods: This is a transversal and multicenter study carried out from January 2017 to December 2018 in three maternity hospitals in Kinshasa where obstetric analgesia is regularly practiced. The collected data (women's characteristics, techniques used, complications and maternal satisfaction) were analyzed with SPSS 22.0 for $p < 0.05$.

Results: One hundred and twenty women were retained out of 4148 deliveries, i.e. 2.8%. The mean age was 31 ± 5.3 years. The majority of women (84.2%) had a university education. The primiparous represented 50.8% and at the beginning the average visual analogic scale was 9.1. Women were ASA I in 85.8% and all pregnancies were full term. Mean cervical dilation before analgesia was 4.5 ± 1.2 cm. Epidural analgesia (89.2%) was the most used technique using bupivacaine (93%) and fentanyl (60.3%). Spinal analgesia was used in 10%. The maintenance was done with the electric syringe pump in 80% and the analgesia was comfort in 86.7%. The mean dilation of the cervix before spinal analgesia was 7cm and 4cm for the epidural. Delivery was vaginal in 88.3% and cesarean section in 11.7% with failure to engage (50%) as the main indication. Arterial hypotension (8.3%) was the most frequent complication and 88.3% of the women declared themselves satisfied.

Conclusion: Obstetric analgesia is practiced in Kinshasa, but still with a very low rate of achievement.

Keywords

Inventory, Obstetric analgesia, Maternity, Kinshasa.

Introduction

Pain is defined by the International Association for the Study of Pain (IASP) as: "an unpleasant sensory and emotional experience associated with present or potential tissue damage or described in terms of such damage" [1]. Obstetric pain is an acute pain that has long been regarded as natural, normal a punishment from God [2]. However, it can cause significant maternal and foetal repercussions (hyperventilation, hypoxia, anxiety, foetal heart rhythm disorders) and become unbearable [3]. Obstetric pain is very

intense regardless of parity [4]. Nearly, 75% of nulliparous women describe their pain as severe, very severe or intolerable. Less than 5% of parturients consider the pain of childbirth to be minimal [5].

In 1993, Melzack [3] compared the intensity of pain from several etiologies and found that childbirth pain was more intense than cancer pain, phantom limb pain and fracture pain. Numerous methods have been proposed for the management of obstetric pain. These include non-pharmacological techniques, which are generally ineffective, systemic or inhaled pharmacological techniques with many side effects, and perimedullary techniques in the form of epidural analgesia (EPA), epidural and spinal

combined analgesia or spinal analgesia (SA) [6-8]. Perimedullary techniques have been shown to be more effective and are commonly used throughout the world [9,10], with no effect on the progress of labour or on maternal and neonatal outcomes [11].

The use of perimedullary analgesia has increased steadily over the last 2 decades. In Western countries, 60 to 80% of parturients benefit from obstetric analgesia [12]. In France in 2003, 62.6% of women had recourse to EPA, 12% to spinal analgesia and 1.7% to parenteral analgesia, compared with 58% EPA in 1998 [6,12]; in 2010, this rate had risen to 77.8% EPA, 2% SA and 0.7% parenteral analgesia [7]. France is said to have one of the highest rates for obstetric analgesia in the world in comparison to Canada, where the rate was 57% in 2009, 45% in the United Kingdom in 2010, and 57% in the United States in 2010 [9,10,12].

In the Democratic Republic of Congo (DRC), Mbombo et al. in 2010 [13] assessed the intensity of obstetric pain, which was rated at least 7/10 by the majority of women surveyed, and 50% accepted obstetric analgesia. They [14] had also described the experience of obstetric analgesia at the Monkole Hospital, without describing the practice in our setting. Our environment is characterised by the conception of childbirth pain as normal, the absence of universal health coverage and an insufficient number of doctors specialising in anaesthesia and intensive care. Thus, unlike the study [14], formerly mentioned, this study will take stock of the practice of obstetric analgesia in maternity hospitals in Kinshasa.

Methods

Type, Period and Setting of the Study

This is a cross-sectional (descriptive), multicentre study carried out in three hospitals in the city of Kinshasa: Centre hospitalier Monkole (CHM), Centre Médical de Kinshasa (CMK) and Clinique Médecins de Nuit) from 1 January 2017 to 31 December 2018. These three hospitals were selected on the basis of a pre-survey that revealed the presence of anaesthetists practicing obstetric analgesia in these facilities, whereas elsewhere this practice did not exist. The CHM is a level II private/state hospital, acting as the general referral hospital for the Mont Ngafula I urban-rural health zone. The CHM is also approved by the Faculty of Medicine at the Kinshasa University as a training ground for doctors specialising in all areas. The Clinique Médecins de Nuits and the CMK are private facilities located in the commune of Gombe, practicing specialized medicine. They have permanent anaesthetists (three for CMK and one for Médecins de Nuit) and staff.

Target Population

All women admitted to the selected facilities who had received obstetric analgesia, whatever the technique used, were included. Those whose records were missing important data for the study have been excluded.

Study variables

The data were collected from the medical records and the variables sought were: sociodemographic (age: grouped in two 20 to 34

years and 35 years and over according to obstetrical risk); level of education: secondary and higher or university. Clinical variables: body mass index: normal between 18.5 and 24.99, overweight between 25 and 29.99 and obese 30 and over; comorbidities, ASA class determines anaesthetic risk from I to V according to the before 2020 version). Obstetrical characteristics (parity: primiparous woman giving birth for the first time, pauciparous: woman having given birth 2 or 3 times and multiparous woman having given birth 4 times or more, age of pregnancy: term between 37 and 42 weeks, preterm before 37 weeks and postterm after 42 weeks of amenorrhoea; state of dilation of the cervix before the start of analgesia, duration of the active phase of labour, route of delivery and indication of any caesarean section). Anaesthetic data (indication for analgesia: comfort or medical; analgesia technique, drugs used and their doses, initial volume injected of the anaesthetic mixture, method of maintaining analgesia, as well as maternal satisfaction). Pain data (visual analogic scale (VAS) before induction and at full dilation). Adverse effects of analgesia (pruritus, hypotension, nausea/vomiting, motor block, sympathetic block, headache, back pain) and neonatal status (APGAR score at 1, 5 and 10 minutes of life, newborn weight and admission to neonatology). Maternal satisfaction was assessed on the basis of pain relief declared by the mother and the absence of maternal and or foetal complications declared by the providers. Three qualifiers were used: satisfied, moderately satisfied and not satisfied, with the limitations that this approach may involve measurement bias.

Statistical analysis

The data were analysed using SPSS version 22.0 software. Quantitative variables were presented as means with standard deviations for symmetrically distributed data, and qualitative variables as percentage frequencies. Student's t-test was used to compare the means. The p-value was set at less than 5%.

Ethical considerations

Authorisations were obtained from the heads of the health facilities concerned. The principles of anonymity and confidentiality were respected, and the protocol had been approved by the Ethics Committee of the School of Public Health of the Faculty of Medicine under number ESP/CE/198/2019. All the women received information on the possibility of obstetric analgesia during the antenatal consultation in the three centres.

Results

Flow chart of women

The figure 1 presents the flow chart of women. One hundred and twenty parturients benefited from obstetric analgesia out of a total of 4,148 deliveries in the 3 hospitals, giving an analgesia rate of 2.89%. (54 women out of 1915 deliveries, i.e. 2.82% at the CHM, 44 women out of 1210 deliveries, i.e. 3.37% at the CMK and 22 women out of 1023 deliveries, i.e. 2.15% at the Clinique Médecins de Nuit). No women were excluded, and analgesia was administered only by anaesthetists.

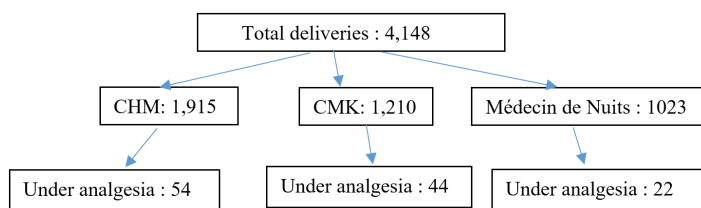


Figure 1: Flow chart.

Sociodemographic, Clinical and Biological Characteristics of Women

The table 1 presents sociodemographic, clinical and biological characteristics of the women. The average age was 31 ± 5.3 years. The majority (75.8%) were aged between 20 and 34 years and 24.2% over than 34 years, 84.2% having completed higher or university education and 15.8% with secondary level. The mean body mass index (BMI) was $26.6 \pm 3.8\text{kg/m}^2$, 57.5% were overweight, 28.3% were normal and 14.2% obese. Pre-eclampsia was present in 4.2%, sickle cell disease in 2.5%, gestational diabetes in 2.5%, hypertension in 1.7%, asthma in 1.7% and heart disease in 0.8%. The ASA class was I: 85.8%, ASAII: 12.5% and ASA III: 1.7%. One woman with sickle cell disease had an Hb <7g/dl, 50.8% had an Hb between 7 and 10.9g/dl and 48.4% had an Hb of 11g/dl or more. The platelet count was over 150,000/mm³ in 83.3% and between 70 and 150,000/mm³ in 16.7%.

Table 1: Sociodemographic, clinical and biological characteristics of the women.

Variables	Frequency n=120	%
Age		
20 – 34 years	91	75.8
>34 years	29	24.2
Study level		
Secondary	19	15.8
Higher/university	101	84.2
Body mass index (BMI)		
Normal	34	28.3
Overweight	69	57.5
Obese	17	14.2
Comorbidity		
Preclampsia	5	4.2
Sickle cell disease	3	2.5
Gestational diabetes	3	2.5
High blood pressure	2	1.7
Asthma	2	1.7
Heart disease	1	0.8
ASA class		
I	103	85.8
II	15	12.5
III	2	1.7
Haemoglobin level		
< 7 g/dl	1	0.8
7 – 10.9 g/dl	61	50.8
≥11 g/dl	58	48.4
Platelets count		
70 – 150,000/mm ³	20	16.7
> 150,000/mm ³	100	83.3

Legend: ASA = American society of anesthesiologists.

Obstetrical characteristics

Table 2 presents the obstetrical characteristics.

Primiparous women accounted for 50.8%, pauciparous for 30.8% and multiparous for 18.3%. Pregnancy was at term in 96.7% of cases and postterm in 3.3%. Analgesia was used for comfort in 86.7% of cases and for medical reasons in 13.3%. The delivery route was vaginal in 89.3% and caesarean in 11.7%. The indications for caesarean section were: failure to engage (7 cases), acute foetal distress (3), stationary dilatation (2) and umbilical cord prolapse (2).

Table 2: Obstetrical characteristics.

Variables	Frequency	%
Parity	n=120	
Primiparous	61	50.8
Pauciparous	37	30.8
Multiparous	22	18.3
Pregnancy age	n=120	
37- 42 weeks of amenorrhoea	116	96.7
> 42 weeks of amenorrhoea	4	3.3
Indication for analgesia	n=120	
Comfort analgesia	104	86.7
Medical indication	16	13.3
Obstetrical procedure	n=120	
Normal delivery	88	73.3
Delivery plus perineal repair	18	15
Caesarean section conversion	14	11.7
Indication of caesarean section	n=14	%
Failure to engage	7	50
Acute foetal distress	3	21.4
Stationary dilatation	2	14.3
Umbilical cord prolapse	2	14.3

Analgesic characteristics

Table 3 presents shows the analgesic characteristics.

Epidural analgesia were the most commonly used technique (89.2%), followed by spinal analgesia (10%) and spinal-epidural combined in 0.8%. For epidural induction, bupivacaine: 0.125 to 0.250% plus sufentanil: 5µg or fentanyl 50µg and for the maintenance 0.06125 to 0.125% of the bupivacaine solution plus sufentanil 0.4-0.5µg/ml or fentanyl: 2- 5µg/ml were used. For spinal analgesia: bupivacaine: 2.5 to 3mg, fentanyl: 20 to 25µg, sufentanil: 2µg, morphine: 100µg were used. Bupivacaine was the most commonly used local anaesthetic (93.3%), combined with fentanyl (60.8%), sufentanil (36.7%) or morphine (4.2%). Electric serynge pum was used in 89.2% and the bolus in 10.8%. The epidural was induced with an average volume of $11.1 \pm 0.7\text{ml}$, 10ml in 66.6% of cases, 8ml in 8.3% of cases and 12ml in 14.1% of cases. The maintenance was assured by continuous injection with an electric syringe pump in 89.2% or bolus 10.8% with an average volume of $11.0 \pm 1.0\text{ml}$, 8ml in 8.3%, 10ml in 66.6% and 12ml in 14.1% of cases.

Table 3: Analgesic characteristics.

Variables	Frequency	%
Analgesic technique	n=120	
Epidural analgesia	107	89.2
Spinal analgesia	12	10
Spinal-epidural combined	1	0.8
Analgesic drugs	n=120	
Bupivacaine	112	93.3
Ropivacaine or levobupivacaine	7	6.7
Fentanyl	73	60.8
Sufentanil	44	36.7
Morphine	3	0.25
Administration	n=120	
Electric serynge pump plus bolus	107	89.2
Bolus	13	10.8
Induction dose for epidural analgesia (ml/h)	n=120	
Bupivacaine: 0.125 to 0.250% plus fentanyl: 50µg or sufentanil 5µg		
8ml	10	8.3
10ml	80	66.6
12ml	17	14.1
Maintenance dose for epidural analgesia (ml/h)	n=120	
Bupivacaine: 0.125 to 0.250% plus fentanyl:2-5µg/ml or sufentany: 0.4 – 0.5µg/ml		
8ml	10	8.3
10ml	80	66.6
12ml	17	14.1
Dose for spinal analgesia	n = 12	
Bupivacaine (2.5 – 3mg)	12	100
Sufentanil (2µg)	6	50
Fentanyl (20-25µg)	3	25
Morphine (100µg)	3	25

Characteristics of labour

Mean cervical dilatation before analgesia was more advanced with spinal analgesia (7cm) than with epidural (4cm), with a significant difference ($p<0.001$). The mean duration of the active phase decreased with increasing parity: multiparous (5.27h), pauciparous (6.44h) and primiparous (7.39h), and the difference was significant ($p=0.021$). The mean VAS before analgesia in primiparous, pauciparous and multiparous women was 9.1, 8.8 and 8.5 respectively, with no significant difference ($p=0.141$). The mean VAS before analgesia was 8.9 and was 2.1 at full dilatation under analgesia ($p<0.001$).

Condition of Neonates at Birth, Complications of Analgesia

Table 4 presents the condition of newborns at birth and complications of analgesia.

The complications were: arterial hypotension due to autonomic block (8.3%), shivering (3.4%), pruritus (2.5%) and vomiting (2.5%). No dural breaches were reported. Data on the intensity of motor block were not found. 14 women had given birth by caesarean section, a rate of 11.7%. The indications for caesarean section were: failure to engage: 7, stationary dilatation: 2, prolapse of umbilical cord: 2 and acute foetal distress: 3. The APGAR score was normal at one and five minutes in 95.8% of cases, depressed in 4.2%, and these 4.2% of newborns were referred to neonatology.

There were 12.5% of babies with macrosomia (≥ 4000 g) and 87.5% with normal weight (2500-3999g).

Table 4: Condition of newborns at birth and complications of obstetrical analgesia.

Variables	Frequency n=120	%
Complications		
Arterial hypotension	10	8.3
Shiver	4	3.4
Pruritus	3	2.5
Vomiting	3	2.5
APGAR score at first minute		
<7	5	4.2
≥ 7	115	95.8
APGAR score at the fifth minutes		
<7	5	4.2
≥ 7	115	95.8
APGAR score at the tenth minutes		
<7	5	4.2
≥ 7	115	95.8
Birth weight of newborn		
2500-3999g (normal)	105	87.5
≥ 4000 g (macrosomia)	15	12.5
Neonatology support		
Yes	5	4.2
No	115	95.8

Maternal satisfaction

One hundred and six (88.3%) of the women were satisfied, 4 (3.3%) were moderately satisfied and 10 (8.3%) were not satisfied.

Discussion

The aim of this study was to assess the practice of obstetric analgesia in maternity hospitals in Kinshasa city. The rate of epidural analgesia in this series (2.89%) is very low, which shows that the technique is not yet widespread and seems to concern more women of high intellectual level because they are probably well informed. Nevertheless, the techniques and protocols used are those recommended. The weaknesses lie in the collection of retrospective data (lack of motor block data) and the measurement of maternal satisfaction using a less objective technique. Financial and cultural barriers (influence of the husband and family) may explain this low rate. Indeed, practitioners said that some women consulted during pregnancy changed their minds on admission to labour because their husband or mother-in-law was opposed to painless delivery.

The average age was 31.0 ± 5.3 years; over 75% of parturients were under 35. These results are similar to those of other authors: Herman [15] 28.2 ± 7.0 years in the USA in 1998, Girard [16] 29.3 ± 5.2 years in Switzerland in 2006, Pilakimwe [17] 30.6 ± 6.6 years in Togo in 2014. On the other hand, a younger mean age was found by: Robert [18] in Ottawa 26 ± 5.0 years, Dhara [19] in India in 2016, 24.1 ± 1.2 years. However, the mean is a measure of central tendency that is highly influenced by extremes. In our

series, primiparous women were majority (50.8%), pauciparous women (30.8%), and multiparous women (18.3%) contrary to other studies [15,17,20] where there were more multiparous women, perhaps because multiparous women in our culture believe that the pain of childbirth is normal and find no benefit in analgesia.

Cervical dilatation at the time of epidural insertion was 4.19cm on average and 7cm for spinal analgesia as found by other authors [17,18]. However, dilatation depends on when the woman arrives in the delivery room. Herman [15]: 7cm, Robert [18]:7cm and Junzang [21]: 6cm found similar results. However, it must be said that the ideal moment to start epidural analgesia is dictated by the intensity of the labour pain. The mean VAS before analgesia was high (8.9 mm), as in the studies by Robert [18], Girard [16] and Senadji [20]. This is logical, as it is the intensity of the pain that prompts the parturient to request analgesia. The rate of conversion to caesarean section was 11.7% in our series. Similar or even high rates have been reported: Robert [18] 13%, Junahang [21] 12.1% and Yancey [22] 18.7%, although Pilakimwe [17] with a small sample of 20 parturients had a rate of 5%. It should be noted that the overall caesarean section rate in the facilities concerned is higher than the one we found, for example 29% in Monkole [23]. The indications for caesarean section (failure to engage, stationary dilatation, prolapse of umbilical cord, acute foetal distress) could not be linked to the epidural as reported by other authors [17,21,24]. Hypotension (8.3%) was the most frequent complication due to the vasoplegia induced by the epidural block, but it had no consequences because it was treated rapidly. Its frequency varied: 20% for Herman [15] who used clonidine and 5% for Pilakimwe [17] with a small sample.

In 95.8% of cases, the APGAR score was good at birth, confirming the current safety of perimedullary analgesia for the foetus and newborn. Bupivacaine alone at low concentrations or combined with morphinic is used without foeto-neonatal effects [18,19,25]. Halliday's meta-analysis [26], recently published in Anesthesia, showed the benefits of reducing the concentration of local anaesthetics.

In our study, 88.3% of women were satisfied, 3.3% were moderately satisfied and 8.3% were not satisfied with the limits of the evaluation technique based on pain relief and the absence of maternal and or foetal complications. Pilakimwe [17] assessed satisfaction two days after epidural insertion on a numerical scale from zero (not at all satisfied) to ten (completely satisfied) and found an average satisfaction of 9.8 ± 0.5 . Sandefo [27] assessed satisfaction on a score from zero to 20 (<10: not satisfied, 10 to 15: satisfied and >15 very satisfied) and found an average of 18/20 in 94% of cases. Clivatti [28] in Toronto in 2011 found 95% satisfaction with the quality of analgesia, despite the occurrence in 1% of cases of dura mater breach, arterial hypotension (9.7%), pruritus (7.1%), nausea and vomiting (7.1%), and foetal bradycardia (7.1%).

Conclusion

Obstetric analgesia, despite not being widespread is nevertheless

practicing in Kinshasa, with 2.9% of deliveries. It is more common in primiparous women and those with a higher level of education. Only perimedullary analgesia techniques are used, with protocols relatively close to those recommended. It would appear that obstetric analgesia techniques are less widely used, and it would therefore seem necessary to popularise them, involving not only anaesthetists but also obstetricians and, why not, spouses. A future study is planned to investigate the reasons for the low use of obstetric analgesia in order to improve the dissemination of these techniques. A prospective or retrospective cohort study would seem to be an interesting way of identifying the advantages of epidural analgesia in our environment.

Acknowledgements

We would like to thank all the managers and staff of the delivery rooms in the hospitals concerned (Monkole, Centre Médical de Kinshasa and SOS médecins de Nuit) and Milka Mbuyi Mbombo for the English correction.

References

1. International Association for the Study of Pain Classification of chronic pain syndromes and definitions of pain terms. Pain. 1986; 3.
2. Hurault L, Van der Mersch J. Bible des communautés chrétiennes Médiapaul. Genève. 1998; 3: 16.
3. Melzack R, Taenzer P, Feldman P, et al. Labour pain as a model of acute pain. Pain 1993; 53: 117-20.
4. Jones L, Othman M, Dowswell T, et al. Pain management for women in labour an overview of systematic reviews. Cochrane Database Syst Rev. 2012; 3: CD009234.
5. Anim Somuah M, Smyth RM, Jones L, et al. Epidural versus non epidural or no analgesia in labour. Cochrane Database Syst Rev. 2011; CD000331.
6. Blondel B, Supernant K, Mazaubrun C, et al. Enquête nationale périnatale 2003 les naissances en 2003 et leur évolution depuis 1998 Dans Etude et résultats. DREES Tome. 2005; 1: 383.
7. Vilain A., Peretti C., Herbet JB, et al. La situation périnatale en France en 2010 Premiers résultats de l'enquête nationale. Dans Etudes et résultats DREES Tome. 2011; 2: 775.
8. Chalmers B, Kaczorowski J, Levitt C, et al. Use of routine interventions in vaginal labor and birth findings from the maternity experiences survey. 2009; 36: 13-25.
9. Redshaw M, Rowe R, Hockley C, et al. Recorded delivery a national survey of womens experience of maternity care 2006. National Perinat Epidemiol Unit. 2006; 6.
10. Liu N, Wu Wen S, Manual D, et al. Social disparity and the use of intrapartum epidural analgesia in a publicly funded health care system. J. Gynecol Obst. 2010; 202: 1-8.
11. ASA Practice Guidelines for Obstetric Anesthesia. Anesthesiology. 2007; 106: 84-63.
12. Blondel B, Kermarrec CM. Enquête nationale périnatale 2010 Les naissances en 2010 et leur évolution depuis 2003 INSERM U 953. 2011.

13. Mbombo W, Ilunga JP, Mukuna P, et al. Acceptabilité de l'analgésie obstétricale dans trois hôpitaux de Kinshasa Ramur Tome 14 Numéro 4. Année. 2010.
14. Mbombo W, Mosolo A, Mbuyi F, et al. Expérience de l'analgésie obstétricale au Centre Hospitalier Monkole. Ramur Tome XXIII N 4. Année. 2018.
15. Herman NL, Kevin L, Sheu, et al. Determination of the Analgesic dose response Relationship for epidural Fentanyl and Sufentanyl with Bupivacaine 0,125% in laboring patients. Journal of Clinical Anesthesia. 1998; 10: 670-677.
16. Girard T, Christian Kern, Irene Hoesli, et al. Markus Christian Schneider Ropivacaine versus bupivacaine 0.125% with fentanyl 1 microg/ml for epidural labour analgesia: a pilot practice more important than pharmaceutical choice. Acta Anaesthesiologica Belgica. 2006; 57.
17. Pilakimwé E, Tabana M, Hamza DS, et al. Pratique de l'analgésie péridurale auprès de 20 parturientes au centre Hospitalier Universitaire Sylvanus Olympio de Lomé. Pan African Medical Journal. 2014; 1937-1988.
18. Robert D. Continuous infusion epidural analgesia for obstetrics bupivacaine versus bupivacaine-fentanyl mixture. Canadian Journal of Anaesthesia 1991; 38: 303-310.
19. Dhara P, Prerana M, Sahil B, et al. Bupivacaine 0.125% versus bupivacaine 0.125% with different doses of fentanyl for epidural labour analgesia: a randomised double blind study. International Journal of Medical Science and Public Health. 2014; 3-4.
20. Sinhadji L, Benali A, Chouicha BB, et al. Analgésie obstétricale pour l'accouchement sans douleur: Une étude prospective observationnelle. Journal Algérien de gynécologie et Obstétrique Juin. 2017; 98: 43-50.
21. Jun Zhang, Michael KY, Mark AK, et al. Does epidural analgesia prolong labor and increase risk of cesarean delivery? A natural experiment. Am J Obstet Gynecol. 2001; 185: 128-134.
22. Yancey Michael K, Brian Pierce, Dina Schweitzer, et al. Observations on labor epidural analgesia and operative delivery rates. Am J Obstet Gynecol. 1999; 180: 353-359.
23. Dibue WM, Muanza NK, Nganzele AM, et al. Determinants of maternal morbidity and mortality related to anesthesia in course of cesarean section in a low income country: Experience from the centre hospitalier Monkole. Open journal of anesthesiology. 2022; 12: 168-183.
24. Thorp JA, Daniel H, Rene M, et al. The effect of intrapartum epidural analgesia on nulliparous labor: A randomized controlled prospective trial. Am J Obstet Gynecol. 1993; 169: 851-858.
25. Murphy JD, Henderson K, Bowden MI, et al. Bupivacaine versus bupivacaine plus fentanyl for epidural analgesia: effect on maternal satisfaction. Department of Anaesthetics Birmingham Maternity Hospital Queen Elizabeth Medical Centre. British Medical Journal. 1991; 302: 564-567.
26. Halliday L, Kinsella M, Cheyne J, et al. Comparison of ultralow and high concentration local anaesthetic for labour epidural analgesia: a systematic review and network meta-analysis. Anaesthesia. 2022; 77: 910-918.
27. Sandefo T, Lebrun, Le Polin B, et al. Analgésie péridurale de travail en Martinique: évaluation de la qualité et de l'accessibilité à l'analgésie péridurale par les parturientes dans une clinique de niveau 1. Annales Françaises d'Anesthésie et de Réanimation. 2004; 24: 26-30.
28. Clivatti J, Siddiqui N, Goel A, et al. Quality of labour neuraxial analgesia and maternal satisfaction at a tertiary care teaching hospital: a prospective observational study. Can J Anesth. 2013; 60: 787-795.