Original Article

Effects of halothane and isoflurane on uterine muscle relaxation during caesarian section

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Summary:

Background: The use of nitrous oxide- oxygen alone for the maintenance of general anesthesia in obstetrics is associated with an unacceptable incidence of awareness. We have to add inhalational anesthetic drug. But still there is a complaint from the obstetricians regarding the triggering effect of Hallothane on uterine muscle relaxation Isoflurane is inhalational anesthetic drug and recently brought to Iraq.

Objectives : The aim of this study is to evaluate and compare the effect of halothane & isoflurane on uterine muscle contraction in caesarian section.

Patient and method: This is a prospective study done on 40 patients in Medical city hospital /Baghdad / Iraq. They were randomly allocated to either the isoflurane group or halothane group ,(each of 20 patients) . Caesarian sections under Standard general anesthesia were donefor all the patints. Time from the delivery of fetus to full uterine contraction was estimated. Also the surgeon graded uterine relaxation on a ten centimeter visual analog scale; the zero point indicated none & the 10 mark sever relaxation respectively.The need for supplementary doses of oxytocin were recorded.

Results: The surgeons' assessments of uterine relaxation indicated that it was significantly less with isoflurane (P- value less than 0.05) and only one patient in the isoflurane group required additional oxytocin as compared to one patent in halothane group. The time required for complete uterine contraction after delivery in patients given isoflurane revealed significant decrease than patients given halothane (P- value less than 0.05).

Conclusion: Isoflurane's effect is less than that of halothane on uterine muscle relaxation during caesarian section . This decreases the incidence of awareness during anesthesia.

Key words :isoflurane, halothane, ceasarean section.

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Introduction:

The use of nitrous oxide- oxygen alone for the maintenance of general anesthesia in obstetrics is associated with an unacceptable incidence of awareness [1]. It has to add inhalational anesthetic drug. Halothane is a halogenated alkane [1 & 2]. It relaxes uterine muscle [1, 2, 3, 4]. MAC [minimal alveolar concentration] value for halothane is 0.75% in O2 [1,2,3,4]. It is reported that concentration less than 0.5% is not associated with increase blood loss during anesthesia for caesarian section, but this causes increase blood loss during curettage. [2, 4] But still there is a complaint from the obstetricians regarding the triggering effect of Hallothane on uterine muscle relaxation.Isoflurane is a methyl ethyl ether CH3CHCLOCHF2 [4] . It was not approved by the Food And Drugs administration in The United State until 1980[2]. It is recently brought to Iraq. The MAC of isoflurane is 1.15% in 100% oxygen[3]. There is controversy about its effect on uterine muscle relaxation. Certain references stated that:"Isoflurane has an effect on pregnant uterus similar to that of halothane" [2,4]. Other stated that halothane has more effect than isoflurane: "Halothane is the most potent uterine relaxant"(5); " even low concentrations (< 0.5%) may decrease uterine contractions", and " Use of halothane during vaginal delivery is not recommended unless uterine relaxation is required (as for version or other intrauterine manipulations) "(6) "Although its safety in obstetrics has not been established by formal studies, isoflurane is used to provide obstetrical analgesia"(7).

This study is designed to evaluate and compare the effect of halothane & isoflurane on uterine muscle contraction in caesarian section.

Patients & method:

This is a prospective study done on 40 patients in The Medical City Hospital /Baghdad /Iraq. Patients selected for the study were healthy, had an uncomplicated pregnancy of more than 37 weeks gestation & were to be delivered by elective caesarian section. Pregnancies complicated by diseases associated with increase bleeding during delivery were excluded e.g. placenta previa, abruptio placentae, hydramnios, myoma with pregnancy, twins pregnancy & grand multiparty [gravid > 3] were also excluded.They were randomly allocated to either the isoflurane group or halothane group,(each of 20 patients) . Anesthesia was

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induced by rapid sequence induction with anesthetizing dose of thiopentone (3-5) mg/kg i.v followed by suxamethanium 1mg / kg i.v to facilitate rapid tracheal intubation. Maintenance of anesthesia was with 100% oxygen supplemented by either 0.5% halothane or equipotent concentration of 0.75% isoflurane which were continued until the beginning of skin closure. Ketamine 0.5 mg/Kg was given intravenously to produce analgesia for the time before delivery of fetus. Fentanyl 50 microgram was given intravenously following delivery. Neuromuscular blocker was maintained by atracurium 0.5mg/ kg intravenously. Oxytocin 10 unit or its equipotent dose of [oxytocin (5 unit)+ ergometrine (0.5 mg)][8] were given intravenously at delivery to promote uterine contraction & a further increment was given by intravenous infusion if requested by the surgeon for continued uterine relaxation or if there was bleeding. The mothers ECG, pulse rate, & O2 saturation were monitored continuously & her arterial blood pressure was checked repeatedly. Time from the delivery of fetus to full uterine contraction was accounted to be used as a parameter in assessing the effect of halothane & isoflurane on uterine muscle. The second parameter is a ten centimeter visual analog scale the surgeon graded uterine relaxation on; the zero point indicated none & the 10 mark sever relaxation respectively.

These together with the need for supplementary doses of oxytocin gave a clinical indication of the degree of uterine relaxation.

Reversal of muscle relaxant was done by giving neostigmine 2.5 mg plus atropine 1.2 mg.

Statistical analysis was performed using the unpaired students t-test, ($p<0.05$) was considered to be significant.

Results:

Forty patients divided between halothane & isoflurane groups were studied. The 2 series were closely comparable with regard to age, weight &duration of anesthesia (table 1).

Table (1): Mean (SD) age, weight & duration of anesthesia for the isoflurane & halothane series.

Treatment	Age(years)	Weight (kg)	Duration of anesthesia.(min)
Haluthane (n:2o) Mean (SD)	29.8(5.67)	78.125(11.319)	40:54(5:66)
Isoflurane(n:2o) Mean (SD)	31.0(5.83)	79.021(10.120)	41:22(5:42)

The surgeons> assessments of relaxation indicated that this was significantly less with isoflurane (P- value less than 0.05) and only one patient in this series required given additional oxytocin as compared to one patent in halothane group as shown in (table 2)The time required for complete uterine contraction after delivery is (2.586 min) in patients given isoflurane as compared to (4.593 min) in patients given halothane and this revealed significant difference (P-value less than 0.05) as shown in (table 2)

Table (2) : VAS of Uterine relaxation, time for complete uterine contraction, and the need for additional piton in Haluthane and Isoflurane groups

Treatment	Haluthane (no.:20) Mean (SD)	Isoflurane (n:20) Mean (SD)	P.value
VAS of Uterine relaxation	3.056 (2.209)	1.766 (1.528)	0.001
Time for complete uterine contraction	4.593(3.316)	2.586(2.208)	0.01
Additional piton	Single case 5 unint	Single case 10 unint	

Discussion:

The degree of uterine relaxation or bleeding when isoflurane used in 0.75% concentration throughout the operation, is less than that occurs when halothane used in 0.5% concentration.

R.G.Ghaly, R.J.Flynn, and J. Moore in their study (isoflurane as an alternative to halothane for caesarian section) (9) used the surgeon>s assessment and the need for additional piton as 2 clinical indication of the degree of uterine relaxation (as we did in this study) but they didn>t account the time required for complete uterine muscle contraction (the 3rd parameter that was used in this study) ,also they used the mother>s pre- and postoperative (at 24 hours) haemoglubine and hematocrit as a parameter for blood loss which indicates the degree of uterine relaxation (the parameter that isn>t be used in this study). R.G.Ghaly and his colleges> study resulted in significant decrease in VAS in Isoflurane group than halothane group (this was similar to the result of this study). The mother>s pre- and postoperative hemoglobin and hematocrit values revealed that no patient required blood transfusion for intraoperative blood loss according to anesthetic assessment. Out of 25 patients for each group 4 patient of Isoflurane group and 8 patient for halothane group needed additional dose of piton , in this study a single patient from each group required additional piton but that of halothane group required 10 unit versus 5 unit for that of isoflurane group.

Abboud TK, et al. in their study Isoflurane or halothane for cesarean section: comparative maternal and neonatal effects,(12) «patients were randomly assigned to one

of three groups of 20 each (inspired 0.5% isoflurane, 1% isoflurane or 0.5% halothane), combined with 50% N2O and O2.» They found that «maternal blood loss did not differ significantly among the three groups», and «concluded that isoflurane is a safe supplement to N2O - O2 mixture for cesarean section and is a safer alternative to halothane in situations when patients are receiving beta-adrenergic therapy require cesarean section since halothane might potentiate arrhythmias caused by beta adrenergic agonists.»

This is very Important study regarding the use of isoflurane in higher concentration (1%) in 2nd group, than that used in our study and it is more than the equipotent concentration of halothane (0.75%), and the result was the same as 0.5/ halothane

Such use has the advantage of further decreasing the likelihood of maternal awareness. An audit of 'awareness' during G.A. Caesarian Section was done at a lithuanian hospital and revealed that 12% of 150 patients questioned remembered the pain of surgery.(10) To reduce fetal depression and uterine relaxation, anesthetists have sometimes used low doses of anesthetic agents in a paralyzed mother during CS. This has resulted in some mothers being awake and in severe pain.(11) S0 the use of isoflurane in the maintenance of general anesthesia during caesarian section in addition have a lesser effect on uterine muscle relaxation, it can be used in higher than its equipotent concentration of halothane and this in turn can decrease the awareness which is one of important problem during caesarian section under general anesthesia

Conclusion:

Isoflurane's effect is less than that of halothane on uterine muscle relaxation during caesarian section . This may decrease blood loss at caesarian section

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