INTRODUCTION
One of the most amazing and beautiful phenomena in the world is the child birth. Passing the embryonic phase and entering into life in the world outside of the womb is accompanied by serious and quick physiologic changes. That is why the newborn needs to be evaluated right after birth (Eslami and Fallah, 2008). Apgar score of newborns is a scientific, systematic, and rapidly obtained method which is one of the important indices of evaluating newborns’ status after birth (Badr, 2007; Rafati et al., 2006). If childbirth via Normal Vaginal Delivery (NVD) is not safe for mother and the child, Cesarean surgery seems necessary (Martin et al., 2007). In the last 30 years, the rate of Cesarean surgery has considerably grown in both developed and developing countries (Martin et al., 2007) in a way that now it is one of the most common surgeries which takes place all over the world (Badr, 2007; Nikpour et al., 2011). More than 60% of pregnant women in Iran ask for Cesarean surgery because of unjustified reasons like fear of labor pain, or natural childbirth complications (Rafati et al., 2006; Nikpour et al., 2011; Jafari et al., 2000). So, regarding the growing number of newborns that are born via Cesarean surgery, one of the concerning issues for mothers is the change and decrease of Apgar score for Cesarean babies which is directly related to increasing rate of death in these children. Consequently, paying enough attention to mothers’ and newborns’ complications is essential. Anesthesiologists must choose the healthiest way for Cesarean mothers which has the least side-effect on the child (Badr, 2007; Forghani et al., 2003). One of the influential factors on low Apgar score of the child is the type of anesthesia. In the study conducted by Zhakarya et al., on 150 newborns with low Apgar score (lower than 7), and 150 newborns with high Apgar score it was reported that some of the most common influential factors on the low Apgar score of newborns were Cesarean surgery with General anesthesia and preterm labor. There was a significant difference between the type of anesthesia and the low primary Apgar score of the newborn (Hoseinian et al., 2010). In the study of Kolatat et al., (1999) the Apgar score of the newborns whose mothers were under General anesthesia were lower than the Apgar score of the children whose mothers received regional analgesia (Kolatat et al., 1999). Although General anesthesia is considered as an old alternative...
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method (Martin et al., 2007; Jafari, et al., 2000), the use of Spinal anesthesia method has recently developed very much because of high rate of General anesthesia side-effects (Martin et al., 2007). The results of Jafari et al., (2000) study confirmed that the side-effects of General anesthesia are higher than Spinal anesthesia (Jafari et al., 2000). The study of Mancuso et al. on 179 pregnant woman with optional Cesarean surgeries in three groups of General anesthesia, Spinal anesthesia, and the group of changed from General anesthesia into Spinal anesthesia reported that the lowest amount of disorder (1.1%) was seen in the newborns of Spinal anesthesia group, and the highest amount of disorder (25.9%) was seen the newborns of General anesthesia group. Among anesthesia methods, Regional analgesia had more supremacy in newborns’ consequences (Mancuso, 2010). The Spinal anesthesia in Cesarean surgeries has been introduced as the best method in the Teaching Hospital of Lako University (Afolabi, 2003). The recent study in Malawi showed that the death rate of mothers and children who undergone General anesthesia was higher than the death rate of those who received Spinal anesthesia. Consequently, it is recommended that Spinal anesthesia becomes the chosen method in the developing countries. Nowadays in the developed countries, regional analgesia is the first option in Cesarean surgeries and General anesthesia is considered as the second option. In some parts of Canada, most of its big cities, the areas which are connected to the capital, and major hospitals, regional analgesia is considered as the primary method (Badr, 2007; Martin et al., 2007). In 1992, 84% of Cesarean surgeries were conducted by using regional analgesia method, and the rest were conducted by using General anesthesia in the USA (Forghani et al., 2003). In 1998, 90% of optional Cesarean surgeries and 80% of emergency Cesarean surgeries were done through Spinal anesthesia (Norouzi et al., 2007). In the Hospital of Westindies University in Antigua, the percent of using Spinal anesthesia increased from 20% in 1996 to 80% in 2001, and reached 90% till 2002 (Martin et al., 2007). Regarding the high rate of Cesarean surgery with General anesthesia in Iran, ambiguity and difference among the results of some studies on the effects of anesthesia type on newborns’ Apgar, and also using Spinal anesthesia as the superior method in some countries, the researchers decided to evaluate the impacts of General anesthesia method and Spinal anesthesia method on newborns’ Apgar score by omitting intervening variables.

METHODOLOGY

This cross-sectional study was conducted on 172 pregnant women who were healthy and term candidates of optional Cesarean surgery in Imam Ali Hospital of Amol. The samples used in this study were judgmental samples. 86 women were placed into General anesthesia group and other 86 women were placed into Spinal anesthesia group in a way that from among the pregnant women who had come to this hospital- after confirmation of a gynecologist and anesthesiologist- the women who had high-risk pregnancy (those who had illness records, or who had used medicines which had side-effects on embryo’s health and …), the newborns who were risky (congenital anomalies), as well as mothers for whom it took more than 15 minutes from inducing anesthesia to newborn retrieval were considered as intervening variables on newborns’ Apgar score and omitted from the sample. Finally, 172 healthy mothers who had delivered healthy babies were studied, and then, the babies Apgae scores were analyzed in both groups.

In General anesthesia method, such medicines as Thiopental Sodium (5 mg/kg), Succinyl Choline (1.5 mg/kg), Halothane (0.5%), Nitrous oxide and Oxygen with proportion of 50%, and Neuromuscular (0.5 mg/kg) were used. In Spinal anesthesia, 75 mg of Lidocaine 50% (diluted by CSF) and needle number 24-25 were used through inter lumbar vertebrae space of L₃-L₄ or L₄-L₅.

By using chronometer, time intervals of inducing anesthesia to womb cut and womb cut to newborn retrieval were estimated. Also, Apgar of minute 1 and minute 5 were scored through common method of scoring. Such variables as mother’s age, newborn’s age and sex were recorded through checklists by the researchers. Selected people participated in the study with complete consent and without any intrusion by the researchers, and the data was recorded totally confidentially. After data gathering, the data was analyzed by spss16 and descriptive analytical statistics (independent T-test, and Pearson correlation coefficient). P<0.05 was considered as significant.
RESULTS AND DISCUSSION

The Findings

Regarding the results of the research, the average of mothers’ age in General anesthesia group was (ci 95%: 26.177 – 25.303) 25.74 years of age, and in Spinal anesthesia was (ci 95%: 28.900 – 27.900) 28.40 years of age. The average of newborns’ age in General anesthesia group was (ci 95%: 39.206 – 39.034) 39.12 weeks, and in Spinal anesthesia group was (ci 95%: 39.145 – 38.995) 39.07 weeks. In General anesthesia group, 49 babies were girls (57%) and 37 were boys (43%). In Spinal anesthesia group, 46 babies were girls (53.5%) and 40 were boys (46.5%).

The average of Apgar minute 1 in General anesthesia group was 8.24±1, and in Spinal anesthesia was 8.64±0.76, (p= 0.005). The average of Apgar minute 5 in General anesthesia group was 9.83±0.55, and in Spinal anesthesia was 9.88±0.32, (p= 0.4).

The average time of starting surgery to womb cut in General anesthesia group was 155.31±69.06 seconds, and in Spinal anesthesia group was 157.85±60.51 seconds; there was no significant difference between the two groups (p= 0.79). The average of womb cut time to newborn’s retrieval was 49.69±26.08 seconds in General anesthesia group, and 57.05±31.92 seconds in Spinal anesthesia. There was no significant difference between these two groups (p= 0.10).

The average of total time of starting surgery to newborn’s retrieval was 205±73.95 seconds in General anesthesia group and 214.90±73.97 seconds in Spinal anesthesia. There was no significant difference between the two groups, (p= 0.38). As a result, there was no significant difference between the two groups of General anesthesia and Spinal anesthesia in the above-mentioned times from statistics point of view.

Table 1: Mean and Standard Deviation of Apgar Minute 1 and Apgar Minute 5 for the Newborns through Optional Cesarean

<table>
<thead>
<tr>
<th>P-value</th>
<th>Mean</th>
<th>Number</th>
<th>Apgar</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.005</td>
<td>8.24 (1)</td>
<td>86</td>
<td>Minute 1</td>
<td>General anesthesia</td>
</tr>
<tr>
<td></td>
<td>8.64 (0.76)</td>
<td>86</td>
<td>Spinal anesthesia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.83 (0.55)</td>
<td>86</td>
<td>General anesthesia</td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>9.88 (0.32)</td>
<td>86</td>
<td>Minute 5</td>
<td>Spinal anesthesia</td>
</tr>
</tbody>
</table>

Table 2: Mean and Standard Deviation of in Surgery Times of Optional Cesarean (in seconds)

<table>
<thead>
<tr>
<th>Starting surgery to newborn retrieval (SD)</th>
<th>Womb cut to newborn retrieval (SD)</th>
<th>Starting surgery to womb cut (SD)</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>205 973.95</td>
<td>49.69 (26.08)</td>
<td>155.31 (69.06)</td>
<td>General anesthesia</td>
</tr>
<tr>
<td>214.90 (73.97)</td>
<td>57.05 (31.92)</td>
<td>157.85 (60.51)</td>
<td>Spinal anesthesia</td>
</tr>
<tr>
<td>0.87</td>
<td>1.65</td>
<td>0.25</td>
<td>T</td>
</tr>
<tr>
<td>0.38</td>
<td>0.1</td>
<td>0.79</td>
<td>P-value</td>
</tr>
</tbody>
</table>

CONCLUSION AND DISCUSSION

The results of this research revealed that the Apgar of newborns in minutes 1 and 5 in General anesthesia group is lower than the newborns in Spinal anesthesia group. In the study of Sultan et al., (2004) on 50 pregnant women with optional Cesarean surgery, the Apgar score of newborns in minutes 1 and 5 in General anesthesia group were meaningfully lower than Spinal anesthesia (Sultana et al., 2004). In the study conducted by Martin et al. on term and preterm newborns, as well as the study of Afolabi et al. on newborns who were born through emergency Cesarean, there were same results achieved (Martin et al.,
2007; Afolabi et al., 2003). In the studies of Lucas et al., (2000) on 202 babies born through Cesarean surgeries with General anesthesia method, the Apgar score of minute 1 was significantly lower than Spinal anesthesia (Lucas et al., 2000). This result is in congruity with the results of references number 7, 12, and 15. By the way, in some studies, there was no clear difference seen between the Apgar score of newborns in two methods of General anesthesia and Spinal anesthesia. In a study on 1586 pregnant women who undergone Cesarean surgery within two groups of General anesthesia and regional analgesia, it was revealed that the Apgar minute 1 and Apgar minute 5 were lower in General anesthesia group. However, there was a same portion of newborns who suffered from asphyxia, and no evidence regarding supremacy of any anesthesia method on the other one- from the view point of mother or newborn complications- was found (Afolabi et al., 2007). In a study conducted on 84 pregnant women who undergone optional Cesarean surgery in two groups of Spinal anesthesia and General anesthesia, it was concluded that newborn complications were the same, and there was no significant difference, neither any influence on newborn Apgar score (Kavak et al., 2001). The study of Petropoulos et al. on 238 women with normal pregnancy and optional Cesarean surgery in three groups of General anesthesia, Spinal anesthesia, and epidural anesthesia, the results showed that the neonatal sequence was the same and the type of anesthesia had no effect on neonatal consequences (Petropoulos et al., 2003). Also in a study on 96 pregnant women aged from 18 to 40 years of age who suffered from Eclampsia, it was revealed that there was no significant difference between Apgar minute 5 in two groups of General anesthesia and Spinal anesthesia (Rafiee et al., 2003). In Tonni et al., (2007) study on 900 pregnant women who had optional Cesarean surgery in three groups of General anesthesia, Spinal anesthesia, and epidural anesthesia, it was concluded that the status of embryo and newborn was better in epidural anesthesia than the other two methods (Tonni et al., 2007). Regarding the results of this research and other researches, from among various reasons (mother-related, placenta, umbilical cord, or embryo), it is possibly the type of anesthesia medicines used for mothers (Badr, 2007) which is influential over the low Apgar score (Kezri and Olad, 2005). This factor directly and indirectly affects on the newborn in General anesthesia and Spinal anesthesia (Rafati et al., 2006), and must have the lowest adverse effect on embryo and newborn’s Apgar score (Badr, 2007). Besides, the adverse effect of the medicine has a direct relation with the amount and time of describing the medicine before the delivery (Rafati et al., 2006). Almost most of anesthesia medicines quickly pass through placenta and badly affect on embryo, like Asidosis, Hypoxia, breathing disorder, and also decreasing effects on newborn’s Apgar score (Jafari et al., 2000). In a study on 100 newborns who were born in three groups of normal vaginal delivery, General anesthesia, and Spinal anesthesia, it was revealed that the newborns’ Apgar score was significantly lower in General anesthesia group which was reported to be the result of anesthesia medicine passing through the placenta and its breathing deteriorating effect, and increasing the time of anesthesia (Rafati et al., 2006). In various studies, the higher Apgar score in Spinal anesthesia method in comparison to General anesthesia method is due to decreasing of adverse drug effects in Spinal anesthesia method (Jafari et al., 2000; Forghani et al., 2003; Rafiee et al., 2003). Of course in Cesarean surgery with Spinal anesthesia, if the medicines are not used correctly, the sympathetic system will stop, and decrease in mother’s blood pressure will reduce the bloodstream in womb and placenta, as well as causing Hypoxia and Asidosis of the embryo. Although in minor Asidosis there is no danger for the newborn, major Asidosis can sometimes cause permanent and irreversible complications, and can increase the death rate in newborns (Rafati et al., 2006). In a study on pregnant women with optional Cesarean surgery in three groups of General anesthesia, Spinal anesthesia, and Epidural anesthesia, the lowest acidity and highest Oxygen pressure was reported in Spinal anesthesia group (Tonni et al., 2007). Another study confirmed the lower acidity of newborn’s umbilical artery in Spinal anesthesia method- compared to General anesthesia, while revealed that if the Cesarean surgery is not emergency, it does not affect the newborn’s umbilical artery (Afolabi et al., 2007). In an analysis on 200 newborns through normal vaginal delivery and 200 term newborns through optional Cesarean surgery, there was a positive difference between Acidemia and Apgar minute 1 and Apgar minute 5 (Aminzadeh, 2006)). In their study on 96 mothers in two groups of high risk pregnancy and low risk pregnancy- among which emergency Cesarean consisted the largest part.
of risk factors, AhmadPour-Kacho et al., (2010) came to conclusion that the *Apgar score* minutes 1 and minute 5 as well as the amount of acidity of newborn’s umbilical artery in low risk group was higher than high risk group. Besides, there was a meaningful difference, while for low risk mothers, there was not a significant difference between acidity of umbilical artery and newborn’s *Apgar score* (Ahmadpour-Kacho et al., 2010). With regard to afore-mentioned subject, in the study of Jafari et al., (2000) the *Apgar score* of newborns who were born through *Spinal anaesthesia* was higher than those who were born through *General anaesthesia*, despite the high amount of newborn’s Acidemia (Jafari et al., 2000). Another influential factor on newborns’ *Apgar score* is the time of closing umbilical cord. As shown in Jahazi et al., (2008) study on 64 healthy term newborns from mothers with normal vaginal delivery in two groups of early closing (30 seconds) and late closing (3 minutes) of umbilical cord, late closing of umbilical cord will significantly increase the *Apgar score* of the newborns (Jahazi et al., 2008). Furthermore, it is possible that mothers’ stress is one of the factors influencing over newborns’ *Apgar score*. Bazrafshan et al. study revealed that the amount of stress in women while pregnancy and also while delivery increases the amount of Epinephrine in Plasma which is influential over the newborns’ *Apgar score* of minute 1 and minute 5. In this regard, a significant negative statistical relationship has been achieved (Bazrafshan and Mahmmodizadeh, 2009).

Laudenbach et al., (2009) showed that in Cesarean surgery with *General anaesthesia* method, mothers and newborns are exposed to more stress and higher levels of stress level than *Spinal anaesthesia* method (Laudenbach et al., 2009). This finding is in congruity with the findings of other researches (Adam et al., 2003; Kale et al., 2006). The higher *Apgar score* in *Spinal anaesthesia* method is due to mother’s awareness and relative blockage of sympathetic system which leads to lower decrease of stress of such hormones as Epinephrine and Norepinephrine. However, in *General anaesthesia* method, as a result of disorder in sympathetic system as well as direct effect of Adrenal Glands, the reduction of these hormones occurs more (Forghani et al., 2003; Norouzi et al., 2007; Rafiee et al., 2003).

In this paper, there was no significant difference between newborn’s *Apgar* minute 1 and minute 5, and time intervals of starting surgery to womb cut, womb cut to newborn retrieval, starting surgery to newborn retrieval in two groups of *General anaesthesia* and *Spinal anaesthesia*, and the two groups were the same. In Forghani et al., (2003) study, there was no significant difference between above-mentioned time intervals and newborns’ *Apgar score* in minute 1 and minute 5 (Forghani et al., 2003; Norouzi et al., 2007). In the study of Martin et al., increasing the time of *General anaesthesia* (more than 10 minutes) was concluded to be one of the probable influential factors in decreasing the *Apgar score* (Martin et al., 2007). Bazrafshan and Mahmmodizadeh (2009) study concluded that if the time of inducing anesthesia to newborn retrieval takes less than 15 minutes, there will be no threats for the baby, and the anesthesia medicine (including Propofol) cannot affect on newborn’s *Apgar score* negatively (Badr, 2007). In the present study, this time was estimated no more than 5 minutes.

Another factor which is influential on newborn’s *Apgar* and considered in the process of decision making about the anesthesia method is the side-effects of each anesthesia method. Algert et al., (2009) in their study, mentioned that not only short-term side-effects of *General anaesthesia* must be paid attention, but long-term side-effects must be noticed also (Algert et al., 2009). It must also be considered that general outbreak of side-effects in mothers who undergone Cesarean surgery with *General anaesthesia* is more than *Spinal anaesthesia* method (Tonni et al., 2007). These side-effects have their final influence over the embryo and newborn’s *Apgar* (Norouzi et al., 2007). In the conducted analysis, most of intraoperative side-effects with *General anaesthesia* included: Hypertension, difficult intubation, Hypoxia as a result of failure in intubation, Pulmonary Edema, Aspiration, Hypovolemic shock as a result of intrauterine bleeding, addition of Hypotension due to description of Thiopental to the afore-mentioned situation, delay in recovery, and mortality (Rafati et al., 2006; Norouzi et al., 2007). On the other hand, in severe crisis of Hypertension, such threats as Cerebral hemorrhage and cardiac problems must be considered (Tonni et al., 2007). *Spinal anaesthesia* has some disadvantages including decrease of blood pressure; decrease of embryo’s heart beat, accidental complete spinal block, urinary retention, abscess or Hematoma epidural, and after delivery headaches (Martin et al., 2007). Decrease of blood pressure is one of the most common
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side-effects in mothers which lead to Asphyxia of the embryo (Tonni et al., 2007). As a result, the Spinal anesthesia method which is a low risk and safe method which leads to delivery of babies with higher Apgar score can be suggested. Limitations of this study included lack of measuring arterial blood gases and newborns’ Apgar score simultaneously, appointing the time of closing umbilical cord and level of mothers’ stress while pregnancy and while delivery. In general, the results of this study revealed that the Apgar score minute 1 and minute 5 of newborns who were born through Cesarean surgery with Spinal anesthesia was higher than those who were born via Cesarean surgery with General anesthesia. Of course, time intervals of starting surgery to newborn retrieval had no effect on the Apgar score. Therefore, choosing Spinal anesthesia method which is a safer method with lower side-effects and leads to delivery of newborns with higher Apgar score is suggested. It must also be considered that Spinal anesthesia method is used in other countries as the best anesthesia method in Cesarean surgeries.

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