Vaginal Delivery or Elective Cesarean Section? A Decision Analysis

Summary

In 1937 the rate of cesarean sections in Boston was 3%. For primiparas, the rate of maternal mortality in cesarean section was 6%¹⁰. At that time no one considered performing a cesarean section without a medical reason. Since then, various improvements in operating techniques, anesthesiology, infection control and blood banks have lowered the risks attributed to cesarean section compared with vaginal delivery³. In addition, life expectancy of women is higher and the number of children per family is lower. As a result the damage to the quality of life in older age, such as pelvic organ prolapse and incontinence becomes more meaningful. These complications are more common after vaginal birth than after cesarean section and as a result vaginal birth (physiological birth) is no longer taken for granted.

In April 2004 the clinical guidelines by the National Institute for Clinical Excellence on cesarean section was published¹¹. In March 2006 the NIH published a statement on cesarean delivery on maternal request⁸. Both documents were written by a team of specialists that went over much of the literature on the subject. These two documents did not give a clear recommendation preferring one mode of delivery over the other, but they do emphasize the need for finding a solution that is suitable for every woman.

The rate of cesarean section as a whole and specifically cesarean section on maternal request is on the rise. According to the NIH statement the rate of cesarean section today in the US is the highest ever. Data from other countries in the developed world shows that this trend is global and not restricted to the US⁸.

A randomized controlled study on the subject, like the one done a few years ago comparing vaginal birth with cesarean section in the management of breech term delivery, was not done. There is a debate about the feasibility of such a trial⁹. It seems that such a trial would not be made in the coming years, mainly because of the difficulty in interfering with such an important decision in a woman's life, a decision that she has an opinion on.

In the absence of randomized trials and because of the difficulty in performing such a trial, there is a hunger among women and obstetricians for tools that will help comparing the different modes of labor¹⁰. These tools are needed to provide women with clear and reliable
data on the different complications of each mode of labor, the rate of these complications, and to help in making the right decision for every woman.

In this paper I tried to compare the two modes of labor by building a theoretical model. Through analyzing this model which is supposed to reflect reality and to include the different variables that influence the decision, I hoped to reach some conclusions. The model used was a decision tree which is used in different fields for analyzing complex decisions. The decision tree helps to compare a number of clinical approaches, each approach constituting a branch in the tree. Each branch divides further into smaller branches that represent all the possible outcomes of each strategy until they reach end points.

The decision tree compares women that choose to try a vaginal birth, to women that choose an elective cesarean section on 39 weeks of gestation. The rate of the various complications was gathered by scanning the literature on the subject. Because there is a large number of complications attributable both to vaginal birth and to cesarean delivery, it was necessary to decide which complications will enter the decision tree and which ones will not. The criterion for including a complication in the tree was that the complication had to create an obvious and meaningful morbidity over a long period of time.

I have compared the two strategies by using the method of utility analysis. The utility values are supposed to reflect the quality of life. The utility values were reached by the authors, by a method called standard gambling, while studying the literature for those complications that their utility values appear in the literature. The utility value of an end point was calculated by multiplying the utility values that led to the end point. Calculating the overall utility for each strategy from the utility of the end points enables us to choose the better strategy. A discounting was made for those complications that appear only many years after the birth, such as pelvic organ prolapse.

Finally, because the results depend on the different variables, entered into the decision tree, a sensitivity analysis was made for all variables. Sensitivity analysis provides a tool for estimating how changes in the different values might influence the results and in this way, find out which variables are most influential.
In order to learn about the preferences of women that went through both cesarean section and vaginal delivery, a survey was made. In the survey, women were asked about their labor experience and about their views on the best mode of delivery and the decision upon it.

The results of the model show that the desired birth plan is an important variable when deciding upon the preferred mode of birth. According to the model, when women desire one child, the approach of cesarean delivery is preferred. On the other hand, when a woman desires three children the preferred mode of delivery would be vaginal birth. A desire for more than three children will only emphasize the benefits of the vaginal birth approach. A plan for two children is borderline according to the base values of the model with a slight preference toward cesarean section.

The results of the decision tree show three other topics that have a vital influence on the preferred mode of birth apart from the birth plan. One is the morbidity associated with weakening of the pelvic floor. Another is the rate and character of complications in future pregnancies and last and most influential is the attitude of the woman and the authorities toward the different modes of delivery, which is represented in the model by utility values.

A bit surprising is the fact that other complications that are much more uncommon such as maternal and fetal death are of very little influence on the preferred mode of delivery. According to the model, a change of the rate of these complications within the range in the literature would not influence the decision.

Most of the data in the literature shows that the correlation between vaginal birth and pelvic floor morbidity is stronger than between cesarean section on request and pelvic floor morbidity. This is the main reason for preferring cesarean section in the case of a sole pregnancy. There is still a need to strengthen the amount of evidence correlating the different modes of labor to pelvic floor morbidity. There is also a need to better evaluate the degree of urinary incontinence and the time frame in which the obstetric history is in fact a risk factor.

The fear of complications in future pregnancies is a primary consideration in making the decision about the mode of delivery and is the main reason for preferring vaginal birth when three or more pregnancies are considered. There is a higher rate of placental pathologies after cesarean sections. However, the exact effect of previous cesarean section on complications in future pregnancies and births remains controversial. The clinical practice pays, in some situations, the current pregnancy a lot of attention, while not paying the full attention to the
effect a cesarean section in the current pregnancy will have on future pregnancies. A remarkable example to this is the management of breech presentation at term. Greater attention should be given to interventions that might affect future pregnancies.

It seems that this approach results from a discounting of future complications made by the opinion leaders, similar to the discounting made in the model. In the analysis it was shown that discounting of utility values is of primary importance and that such a discounting can turn the decision one way or the other. This fact emphasizes that the answer to the question of discounting, which rises in decision analysis, is an important answer.

Complications of low prevalence, were of little influence on the conclusions of the model. The gap between the public conception of a complication such as maternal death and its importance in the model, can be explained by the fact that the model can disregard all emotions that come up when discussing certain complications and give it its appropriate weight according to its prevalence and severity. However, it is possible that this gap is because of an inherent characteristic of the decision tree, seen also in other decision analysis, where the model gives frequent and minor complications more influence than rare and major complications. This problem might be caused by a problematic evaluation of the utility values. There is a need for standardization of utility values and a creation of a wide and reliable database for these values, in order to give this kind of decision analysis more validity.

From the women survey, we conclude that most women think that the pain is more severe during vaginal birth, while the pain during the puerperium was more severe after cesarean sections. This demonstrates the need for better pain control during vaginal labor and after cesarean section. Most women believe that vaginal birth is a better mode of delivery. Most think that cesarean section on maternal request as the sole indication, should not be allowed. These views were influenced by the degree of religiosity of the woman and had no correlation to the severity of pain. One explanation to this correlation is the higher parity in religious families, which is made safer if the births are done vaginally and not by cesarean section. It is also possible that the preference of the natural way of birth reflects, in some manner, the trust in god.

The results of the survey can help advise women, facing the decision on preferred mode of delivery, on the severity of pain in each mode and on the choice of women that went through both vaginal delivery and cesarean section. The survey demonstrates that each woman has her
values and opinions that influence her decisions. In the model, these differences will be expressed through different utility values. The difference in utility values given by different women will result in different conclusions for every woman that are in accordance with her beliefs.

Patient's autonomy means that the patient has full ownership over his/her body and that the patient is the one to decide how to be treated. In the root of this autonomy lies the informed consent. There is a debate on how informed should a woman be when deciding upon the desired mode of delivery\textsuperscript{46}. The Model in this paper can act as a decision aid and enable women to have a clearer picture on the risks and benefits of each mode of labor. This leads to a better understanding of the question and makes the woman's decision, on the preferred mode of birth, more informed.
Reference

5. What is the right number of cesarean sections? Lancet 1997; 349; 815.


