

NEUROSURGICAL INDICATIONS DURING PREGNANCY

S. BRIANI, G. CAGNONI, L. BENVENUTI,
G. GUIZZARDI, R. MORICHI

Department of Neurosurgery
S. Maria Nuova Hospital - Florence (Italy)

In neurosurgery, the problem of the indications during pregnancy always represents a particular matter, because the neurosurgeon finds himself in front of reactions or choices of particular importance or completely different in comparison with normal routine. One can guess how it is necessary, in neurosurgical pathology during pregnancy, to put himself in front of the problem, not only of the mother's life and of her physical integrity, but also of the child.

In a few words and without dramatizing, the problem would be to put within certain limits, the rights of both on the same level.

The relative series is not frequent, but is certainly always important especially for existential implications, or in other words, sentimental implications that every decision can involve, even if today such implications seem to be declined after the abortion legalization and the decreased importance of the voice "child" in the mother-child relation.

This represents an argument which leans more to a philosophical and dialectical philosophy and with the intervention of numerous moral, religious, personal, traditional or casual factors which can influence, on one side, in a determinant way, the behaviour of the neurosurgeon or of the physician and on the other side, the mother's behaviour.

This does not seem to be the place for a discussion that today shows various ways of thinking and therefore, cannot concretely be perceived by those who are not involved in the center of the situation that can be observed.

We will limit ourselves only to the examination of the problem strictly from the technical and behavioural point of view.

We will take into consideration various affections which more frequently affect pregnant women.

SUMMARY

The Authors take into consideration some important forms of vascular and tumoral pathology of neurosurgical interest which can affect pregnant women.

Some criteria of urgency or of delay of the surgical treatment are proposed in the attempt of saving the mother's and the foetus' life.

A) CEREBROVASCULAR DISEASES

Sub-arachnoidal hemorrhage: A study conducted in Ohio in 1961 on maternal mortality, has demonstrated that 10% of maternal death during pregnancy and within the first six months after delivery, are due to sub-arachnoidal hemorrhages⁽¹⁾.

Bano and Freeman⁽²⁾, in a study conducted in 1976 on patients of the Obstetric Clinics of Minnesota during 24 years, have concluded that 4.4‰ of deaths were due to spontaneous sub-arachnoidal hemorrhage (only few cases were demonstrated or by angiography or by autoptic report).

The exact incidence of cerebral hemorrhage during pregnancy is not defined yet, but is rated from 1 to 4 every 10000 pregnancies.

It is important to notice that the arterial or artero-venous malformations tend to bleed during the second trimester of pregnancy or during delivery.

The reason of the bleeding during the second trimester is unknown, while the Valsalva maneuver clearly explains the reasons of the intrapartum rupture.

Arterial cerebrovascular alterations: A study on "strokes", conducted on fertile women, has showed an incidence of 35% in pregnant women or during puerperium. The number of arterial occlusions during puerperium was the same of that occurred during the second and third trimester of pregnancy.

The incidence of stroke in young women in oral contraception, is quite high. The percentage increase is of 6 times according to Vessey⁽³⁾ and of 9 times according to the "Collaborative Study of Stroke"⁽⁴⁾.

The major part of these strokes affect the internal carotid artery.

In the pregnant women the occlusion of the middle cerebral artery are in percentage double of those affecting the contemporary not pregnant women. From various statistics rises a strange datum and

that is the high frequency (30-40%) of strokes of the vertebral basilar system, in patients in oral contraception.

Venous cerebral thrombosis: According to Kalbag⁽⁵⁾, the incidence is of one case every 2500 deliveries. Maybe the incidence is lower, many Authors report one case every 10000 deliveries. The distribution between primiparae secundiparae and pluriparae is of 13/7/7. The etiology is unknown.

A not well accepted theory is that the emboli of the pelvis pass through the paravertebral venous plexi to reach cerebral vein but more valid is the hypothesis that during pregnancy there is an increase in the coagulation factors.

Spontaneous carotido-cavernous fistulas: In general, women with a ratio 3/1 are more often affected. 25% of women affected, develop such a syndrome during the second half of pregnancy or during puerperium.

B) CEREBRAL TUMORS

Barnes and Abbott⁽¹⁾, in their study of 1961, found that cerebral tumors caused one death out of every 2500 pregnant women or within the first six months after delivery.

Cerebral tumors are the reason of death in 8% of maternal deaths.

A high mortality is due to malignant tumors, to intraventricular overtentorial tumors and to subtentorial tumors in general.

The hypophysis adenomas and the parasellar meningiomas can cause not reversible damages of the visus during pregnancy.

Divry and Babon⁽⁶⁾ found that 80% of tumors are clinically evident or grow more rapidly during the second part of pregnancy.

All tumors show a partial regression after delivery.

Small acoustic neurinomas, meningiomas and hemangioblastomas can become

evident during the third trimester of pregnancy and then disappear after delivery, to become again evident after a few months or after a few years.

Michelsen and New (⁷), have demonstrated a "variability" in the tumor's dimension, comparing angiographic examinations of a pregnant patient affected by a cerebral neoplasia and conducted before and after delivery.

Actually we think that by Computerized Tomography such a control is much easier. On the other side even clinically this datum can be verified controlling the variations of the visual field, in pregnant women affected by hypophysis adenomas or by meningiomas of the sella tubercle before and after delivery.

Which can be the mechanisms that can alter the tumoral dimensions?

Weyand (⁸) noticed, in histologic specimens of cerebral tumors removed from pregnant women, that tumoral cells were increased in volume and that their cytoplasm was doubled.

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What does a neurosurgeon have to do with a patient affected by subarachnoidal hemorrhage, or by a cerebral tumor?

First of all a very precise diagnosis has to be made in order to have exact and complete data in hand even if it is not the moment to operate. If the latter becomes urgent and immediate, everything could be executed with accuracy and sureness.

The radiologic examinations can be conducted, if the abdomen is protected. TAC with its low dosage of ionogenic radiation, can be easily utilized. Talking about conservative medical therapy, we could treat the acute situations of cerebral oedema by hyperventilation, which reduces the cerebral blood flow and decreases the intracranic pressure. This represents a sure practice even during pregnancy.

Even hypothermia can be useful for the same purpose. There is a flow decrease

even at uterine level, but the foetus is protected for the decreased metabolic necessities.

Hypoxia doesn't represent a problem if the mother is adequately ventilated. For what concerns steroids, it is known that they have been administered at high dosages to pregnant patients affected by Lupus Erythematosus, without particular damages to the foetus.

The effect of a high dosage of Dexamethazone, which actually is the most valid steroid in the treatment of cerebral oedema, is unknown.

In conditions of extreme seriousness, Mannitol administration has to be taken into consideration. The consequence of such a therapy, if conducted at high dosages (1 liter), as an acute endocranic hypertension requires, are still unknown. The hypertonic expansion of the mother extracellular spaces, produces osmotic power which causes the passage to the mother of foetal free water and of amniotic fluid.

Battaglia (⁹), in his study of 1960, asserts to have infused 1 liter of Mannitol at 20% to a woman, few hours after delivery. He doesn't report which were the conditions of the newborn.

Further experimental studies on the rabbit, with an increase of 25% of plasmatic osmolarity, showed severe effects on the foetus (severe dehydration with 50% reduction of blood volume, cyanosis, bradycardia).

The amniotic fluid has completely disappeared. Therefore, the use of Mannitol, if possible, has to be proscribed if one wants to save the foetus life.

The true surgical indications will have to follow two factors:

- The mother's life.
- The foetus' life.

In fact, one risks the mother's life more easily by a surgical operation during pregnancy, while the foetus risks its life for any operation.

Concerning the first factor, that is the mother's life, it doesn't seem that pregnancy involves particular surgical risks.

Concerning the second factor, that is the foetus' life, we differentiate *urgent* cases from *not urgent* cases:

—When the situation is not urgent, one can and must wait till the end of pregnancy. This is the case of benign lesions or, even if malignant, having a slow growth rate. The same is for all, or almost all the medullar or peripheral lesions, which are never surgically urgent, and can be operated at the end of pregnancy, without particular risks.

All this is valid if one put interest and desire not to interrupt pregnancy and not to risk the foetus' life. In opposite cases the problem are not of surgical indication, but only of anesthesiologic technique and of mother's resistance and particularly of the foetus to a surgical operation.

—Things are much more different when it concerns urgent situations associated to the desire of not risking the foetus' life. In this case we think that there are *absolutely urgent* situations and *relatively urgent* situations.

Absolutely urgent are the arterial aneurisms which have bled and so produced a subarachnoidal hemorrhage. In these cases if one wants to save the mother's life, he has to accept of taking the risk of the foetus' life and the operation has to be made as soon as the mother's clinical conditions allow it.

The same can be said of tumors which give signs leading to endocranic hypertension with or without signs of engagement.

If one doesn't want to hurt the maternal integrity even the increasing visual deficits due to stasis with hemorrhages or to compression of the optical nerves for the expansive lesions, will be treated surgically and immediately.

Relative urgency present the arterio-venous angiomas and tumors in quiescent

phases. The first rarely bleed and is sufficient to program a caesarean section to avoid the expulsive efforts of delivery.

Even for most tumors one cannot establish a fixed rule and we retain that one can wait. Sometimes there are long periods of well-being and situations of neoplastic stasis, if not of regression, which level cases that appeared at a first look very serious.

CONCLUSION

We have to assert the problems in furnishing behavioural rules.

In fact, the problem more or less prevalent is the preoccupation for the mother's life or for the foetus' life.

This preoccupation varies in time, with change in uses and laws.

This guides the behaviour of the physician and succeeds in influencing in a determinant way in the context of the decisional power that in anyway regards the mother, and can be different from the one that occurred earlier and in the future.

BIBLIOGRAPHY

- 1) Barnes J.E., Abbott K.H.: *Am. J. Obst. Gyn.*, 82, 192, 1961.
- 2) Barno A., Freeman D. W.: *Am. J. Obst. Gyn.*, 125, 384, 1976.
- 3) Vessey M. P.: *New Engl. J. of Med.*, 288, 906, 1973.
- 4) Collaborative group for the Study of Stroke in Young Women (1973). *New Engl. J. of Med.*, 288, 871, 1973.
- 5) Kalbag R. M., Woolf A. L.: "Cerebral venous thrombosis". London, Oxford University Press, 1967.
- 6) Divry P., Bobon J.: *Acta Neurol.*, 49, 59, 1949.
- 7) Michelsen J. J., New P. F. J.: *J. Neurol. Neurosurg. and Psychiat.*, 32, 305, 1969.
- 8) Weyand R. D., McCarty C. S., Wilson R. B.: *Surg. Clin. N. Am.*, 31, 1225, 1951.
- 9) Battaglia F., Prystowsky H., Smisson C.: *Pediatrics*, 25, 2, 1960.