

INFLUENCE OF SURGICAL STRESS AND GENERAL ANAESTHESIA ON SERUM FOLLICLE STIMULATING HORMONE (FSH) LEVELS IN FEMALE PATIENTS

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This study was undertaken to investigate the effect of general anaesthesia and surgical stress upon pituitary FSH secretion in females. It has been shown the FSH levels fall progressively commencing with conception and remain low during later stages of pregnancy owing to an inhibition of median eminence (6). A group of pregnant patients considered to have an inhibition and another group of non-pregnant patients considered to be free of this inhibition were assayed for FSH pre- and post-operatively. The mode of action of general anaesthesia and surgical stress on median eminence in effecting FSH secretion was investigated.

Materials and Methods:

Blood samples were taken from 10 female patients undergoing surgery, aged 22-44 years. None of the patients had any disorders of the endocrine system, liver or kidney functions. None had received adrenocorticotrophin, gonadotrophins, corticoids or sex steroids. The blood was centrifuged at 2000 g for 10 minutes and the serum separated. Serum samples were stored at -20°C until assayed.

The effect of surgical stress and general anaesthesia on FSH was examined in 5 normally menstruating women having disorders not related with their endocrine system, and in 5 pregnant women.

Plasma concentrations of FSH were determined in duplicate by radioimmunoassay, using the FSH Kit of IRE (6220 Fleurus-Belgium). The results are expressed as milli international units (mIU/ml.).

Serum samples were taken immediately before the induction of anaesthesia and at the end of the operation. All operations started at 9 o'clock, were carried out in room temperature and the duration of surgery from incision to closure ranged from 0.5 - 2.5 hours. Anaesthesia was maintained with nitrous oxide, oxygen and Halothane following induction with Pentothal. Table 1 shows the amount of anaesthetic agents used in the operations. Lystenon was used in all operations. Synpitan and Methergine were used in the two cesarian sections and in one hysterectomy. About 500-2000 ml. of 5% Dextrose

were infused into each patient during and shortly after the operations. Table 2 shows the patients and the operations.

Results:

Effects of surgical stress and general anaesthesia on plasma levels of FSH were studied in 5 pregnant and 5 normally menstruating women. Pre- and post-operative plasma samples were obtained from each woman and assayed for FSH. Serum FSH levels decreased at the end of the operations in both groups, but this decrease was not statistically significant. The mean pre- and post-operative plasma levels of FSH in normally menstruating women were 4.04 ± 2.30 mIU/ml. and 2.90 ± 3.33 mIU/ml. respectively. The mean pre- and post-operative plasma concentrations of FSH in pregnant women were 2.99 ± 0.91 mIU/ml. and 1.50 ± 0.89 mIU/ml. respectively (Fig. 1).

Pre- and post-operative plasma levels of FSH in pregnant women were found to be decreased when compared with pre- and post-operative plasma levels of FSH in normally menstruating women, but again, the decrease not being statistically significant.

Discussion:

Increased plasma LH concentrations during anaesthesia alone and the early phase of surgical stress was shown by Aono et al. and Maeda et al. (1, 2). Halothane anaesthesia increased LH concentrations by 40% (2) and premedication decreased plasma LH values in men (3).

Increased plasma cortisol levels were observed at the beginning of surgery (1, 4) which returned to the preoperative concentrations on the second post-operative day (1). It has been found that glycocorticoids depress the gonadotropin secretion by a hypothalamic mechanism in rats (5).

Whereas plasma LH increases significantly during the operation and returns to its preoperative values shortly after, plasma FSH shows no intra- and post-operative changes (1). Charters et al. reported that there was no significant intraoperative change in the

concentration of LH in females with normal gonadal functions, postmenopausal females and males (7). The same study also demonstrated a decrease in the plasma concentrations of LH and FSH on the first 2 post-operative days in men undergoing surgery (7). Increased LH concentrations during anaesthesia alone and under surgical stress is thought to occur as a result of the LH secretion through increased secretion of hypothalamic LH-RH (3).

In this study, anaesthesia and surgical stress caused no change in the plasma concentrations of FSH in normally menstruating and pregnant women. There is considered to be a direct effect on the median eminence in inhibiting the synthesis and release of FSH in pregnant women (6). The results of this study show that hypothalamus may not be the focus effected by anaesthesia with Halothane and by surgical stress. However, it is difficult to speculate on the role of hypothalamus under surgical stress and general anaesthesia and further studies are necessary to support our findings.

REFERENCES

1. Aono, T., Kurachik, K., Mituzane, S., et al. (1972) Influence of major surgical stress on plasma levels of testosterone, luteinizing hormone and follicle-stimulating hormone in male patients. *J. Clin. Endocrinol. Metab.*, 35, 535.
2. Maeda, A., Kudo, M., Kudo, T., et al. (1972) Effect of thiopental and surgery on human LH levels. *Masui*, 21, 626 (in Japanese).
3. Oyama, T., Maeda, A., Kudo, T. (1975) Effects of althesin anaesthesia and surgery on plasma concentrations of luteinizing hormone and testosterone in man. *Br. J. Anaesth.*, 47, 1093.
4. Oyama, T., Aoki, N., Kudo, T. (1972) Effect of halothane anaesthesia and of surgery on plasma testosterone levels in men. *Anesth. Analg.*, 51, 130.
5. Hagino, N., Watanabe, M., Glodzeiher, J.W. (1969) Inhibition by adrenocorticotrophin of gonadotrophin induced ovulation in immature female rats. *Endocrinology*, 86, 308.

6. Hirono, M., Igorashi, M., Matsumoto, S. (1972) The direct effect of HCG upon pituitary gonadotrophin secretion. *Endocrinology*, 90:1214-1219.
7. Charters, A.C., Odell, W.D., Thompson, J.C. (1969) Anterior pituitary function during surgical stress and convalescence. Radioimmunoassay measurement of blood TSH, LH, FSH and growth hormone. *J. Clin. Endocrinol. Metab.* 29:63.

Halothane	1%
Oxygen	3 lt/min.
N ₂ O	3 lt/min.
Pentothal	250-375 mg.
Lysthenon	80-150 mg.

Table 1—Anaesthetic agents used in the operations

Normally menstruating group

<u>Name</u>	<u>Protocol</u>	<u>Type of operation</u>
Z.Z.	924278	Vaginal hysterectomy
B.G.	925019	Tibial fracture
G.H.	928114	Total abdominal hysterectomy
M.A.	759950	Vaginal hysterectomy
A.F.	929183	Total abdominal hysterectomy

Pregnant group

<u>Name</u>	<u>Protocol</u>	<u>Type of operation</u>
O.N.	508051	Repeated ceserian section
G.S.	929948	Ovarian cystectomy
U.U.	808081	Ceserian section
K.I.	921809	Hysterectomy
M.P.	937615	Ovarian cystectomy

Table 2—List of operations on which FSH assay was performed

“Greater is the man who forgives more than he forbids.”

Al-Tabib