

# Hysterosalpingography might disturb the functional anatomy of Fallopian tube



Reproductive health is one of the most important prerequisites of the human well-being. Fallopian tubes play the critical role in such health mainly for occurrence of spontaneous pregnancy. Otherwise, the in-vitro fertilization with its limitations and increased risks is the substitute.<sup>[1,2]</sup> This line of management is a complex procedure with high costs and low probability of pregnancy.<sup>[3,4]</sup>

Nowadays, there is an increase in the reported cases of ectopic pregnancy. Such cases are commonly diagnosed late and managed mostly through salpingectomy.<sup>[5]</sup> Despite such reports, no author in the available literature claims the HSG to be itself a possible cause for ectopic pregnancy. This article aimed to clarify the anatomy of the tube and how its function might be disturbed as a result of intrauterine injection of a contrast medium through it.

The uterine tube (synonyms Fallopian tube or salpinx) is called by Gabriel Fallopius who first described it in 1561, considering it a simple connection between the ovary and the uterus for a long time. Nowadays, it is considered not just a passage but one of the most dynamic organs in human body. Its peristalsis and cilia activity are critical for successful retrieval and transport of oocyte through the tube after ovulation.<sup>[6]</sup> The

ovulated oocyte passes from the peritoneal "lateral" orifice of the tube to reach the site of fertilization in the lateral third of the tube. At the same direction, the fertilized ovum and the developing structure pass towards the uterus. Therefore, the lateral (peritoneal) orifice of the tube could be considered the inlet while the other "uterine or medial" orifice of the tube is the exit. Meanwhile, the sperms pass against the motion direction of the cilia through their journey towards the site of fertilization in the distal third of the tube. They reach the site of fertilization through the propelling movements of their tails.<sup>[7]</sup>

This risk of occurrence of ectopic pregnancy has been increased in the last decades with a significant morbidity and even mortality rates. Ectopic pregnancy (EP) could occur due to presence of abnormality in the Fallopian tube impeding the transport of the oocyte or fertilized ovum through the tube.<sup>[8]</sup> The risk for EP includes pelvic surgery, pelvic inflammatory diseases, endometriosis, sexually transmitted diseases, smoking and elderly women.<sup>[9]</sup>

Many cases with apparent tubal patency at HSG do not conceive and classified as idiopathic infertility.<sup>[10]</sup> The unknown or idiopathic causes represent up to 25% of the total cases of infertility.<sup>[11]</sup> Moreover, cases of spontaneous tubal pregnancy have recorded following hysterosalpingography (HSG).<sup>[12]</sup>

Therefore, the contrast media injected through the uterine ostium of Fallopian tube might be potential causes of disturbance of its function; and may be a cause of ectopic pregnancy or even infertility.

The tube is lined with a mucous membrane arranged into longitudinal folds. Its epithelium is formed

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mainly of two types of cells; ciliated and secretory cells. Its state varies considerably with the physiological changes; showing cyclical changes with the ovarian and menstrual cycles and throughout the female life. The cells are low in height at the menstrual phase of the cycle, increasing gradually to reach their peak around the periovulatory stage [13]. At the first "follicular" stage, the two types of cells are nearly of equal height. At the second "luteal" stage, the secretory cells become higher with prominent cytoplasm and sometimes rupture into the tubal cavity. After menopause, there is cell atrophy but its onset is variable.<sup>[14]</sup> Moreover, receptors for estradiol and progesterone have been identified in the mucosa of the tube; being affected by their changes. The ciliary beat frequency (CBF) is  $5.3 \pm 0.2$  Hz with no marked difference regarding the different parts of the tube.<sup>[15]</sup> The ciliated cells generate unidirectional flow toward the uterus.<sup>[16]</sup> The ciliary function could be affected by cigarette smoking as well as pathological cases such as endometriosis and infections. We suggest that introducing substances or materials inside the tubes such as done in HSG also might affect the cilia to be no longer bathed in the physiological tubal secretions. These secretions are rich in steroid hormones and could also affect the CBF.<sup>[15]</sup> It might also affect the circulatory and neuronal network of the ciliated cells and could disrupt CBF. Moreover, the decrease in the ciliary activity and ciliated cells predisposes to occurrence of ectopic pregnancy.<sup>[17]</sup> We add that not only ectopic pregnancy but also unexplained infertility might occur.

Some authors claimed that HSG is out of date and should not be the first line of investigation in tubal infertility.<sup>[18]</sup> HSG adds a little in prediction of the occurrence of pregnancy; however detection of bilateral tubal occlusions means that chances of pregnancy to occur are minimal.<sup>[19]</sup> On contrary, others suggested a therapeutic role to HSG in enhancing subfertility in addition to its use in assessment of tubal patency.<sup>[20]</sup> The therapeutic effect might be attributed to the force applied to the administered material to dislodge a mucous impacted in the tube. This action could be achieved by installing other substances even air or gases. Both oil-based and water-soluble iodinated contrast media commonly used in HSG have potential toxicity to the tubes and peritoneum. This toxicity could be due to viscosity, osmolality and iodine contents of the contrast substance.<sup>[21]</sup> Hysterosalpingo-contrast-sonography using saline and Echovist has been suggested to replace HSG, being a well-tolerated outpatient technique and avoiding exposure to X-ray irradiation.<sup>[22]</sup>

## CONCLUSION

It is concluded that injection of dye or any contrast medium into the fallopian tube in a direction against that of the normal flow might disturb the function of the cilia as well as the internal environment of the tube.

Future researches are recommended to find out a new method depending on aeration as a diagnostic and therapeutic method for simple Fallopian tube occlusion.

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