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Methhaemoglobinuria following Tubal Recanalization with Chromopertubation: A rare case

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Abstract

Tubal recanalization surgery is commonly used in the developing countries for tubal ligation reversal.Chromopertubation done along with tubal recanalization is used for assessing tubal patency during fallopian tubal recanalization. Methylene blue (dye used for chromopertubation) induces methemoglobinemia at doses greater than 7 mg/kg of body weight. But in our case, A total of 20 mg of methylene blue at a concentration of 0.5 mg / ml in 100ml of normal saline and was used in a concentration of 0.5%. Inspite of using a lower concentration and low amount of methylene blue, our patient had developed methaemoglobinuria. We report a case in which we encountered greenish blue colored urine after tubal recanalization surgery with chromopertubation .

Keywords: Methhaemoglobinuria ,Greenish blue urine sign, chromopertubation, infertility , intravasation, methylene blue, tubal recanalization.

Introduction

Female sterilization is one of the most common form of contraceptive method in developing countries . A small number of women, however, opt for reversal of sterilization procedures after various reasons like loss of child , remarriage or regret. The procedure used for reversal is called fallopian tubal recanalization . Chromopertubation is used for assessing tubal patency during fallopian tubal recanalization.The guanylate cyclase (GC) and inducible nitric oxide (iNOS) inhibitor methylene blue (MB) has been a standard agent in clinical medicine used as a dye for for the past 100 years for tracing fistulae and other aberrant tracts,

to check integrity of bladder during surgery and the patency of fallopian tubes.[1]

In addition to being a staining material, it is used as an antiseptic in the genitourinary system, as a topical agent with polychromatic light in some viral infections (herpes simplex virus), and in the treatment of urolithiasis in combination with ascorbic acid [2].

During the procedure of tubal recanalization with chromopertubation, methylene blue solution is introduced into the uterine cavity following which the solution should flow through the fallopian tubes into the abdominal cavity and thus become visible . No externally visible passage of solution is present beyond the previously blocked portion of the fallopian tube in the case of improper tubal recanalization,.

We report a case in which after tubal recanalization surgery with chromopertubation using methylene blue as a contrast agent we encountered greenish blue colored urine.

Case Report

A 25 year old lady, Parity 2 Living 2 with tubal ligation done 3 years back, reported to our tertiary care centre for reversal of tubal ligation. A Tubal Recanalization procedure was performed and patency was checked using methylene blue. A total of 20 mg of methylene blue at a concentration of 0.5 mg / ml was administered into the cavity through a uterine manipulator. A free spill of the dye was observed from the bilateral fimbrial end hence confirming success of recanalization. Recovery from general anaesthesia was uneventful. Immediately post- operatively after emptying the OT pending clear urine from the urobag, patient was found to have greenish blue coloured urine (Fig. 1). An examination performed which revealed a pulse rate of 80/minute, blood pressure of 120/80mmHg and pulse oximeter saturation of 98%.

Figure 1: Greenish blue colored urine post-operatively in urobag.

Methhaemoglobinuria was suspected . Therefore arterial blood gas analysis was done which was found normal. The patient was kept under observation .Supportive therapy like oxygen was administered and strict input/output chart was maintained. Urine output and vitals of the patient remained within normal limits despite greenish blue color of urine. The color of the urine started to lighten on the first day of the postoperative period and reverted back to normal completely on the second postoperative day. As the patient was clinically stable and the colour of urine reverted back, no active intervention was required . Patient was discharged on day 3rd post operatively and had no complaints on follow up.

Discussion

Methylene blue also known as 3, 9- bisdimethyl amino phenazothionium or tetramethylthionine chloride is used based on its tissue staining properties and its oxidation reduction functions.It exhibits different

effects in different concentrations. In low concentrations, it appears to increase the speed of the reversal of methemoglobin to haemoglobin. Paradoxically, in high concentrations, methylene blue oxidizes the ferrous iron of reduced haemoglobin to the ferric state, thus changing haemoglobin to methemoglobin.[1] Methemoglobin cannot carry oxygen and when present in excess, results in a functional anemia. It also shifts the oxygen dissociation curve to the left, limiting the release of oxygen to tissues. [11]

Hypoxia and anaerobic metabolism are symptoms mostly seen in methahemoglobinuria are due to. Measuring the methemoglobin levels by co-oximetry (photospectrometry) is used to confirm the diagnosis. In methemoglobinemia the pulse oximeter readings may not be accurate but they may be helpful when compared to that of an ABG. The difference between the measured oxyhaemoglobin of the pulse oximeter and the calculated oxyhaemoglobin of the ABG, is called a “saturation gap” ,which if exists , methemoglobin may be the cause. With a methemoglobin level of 3-15% skin can turn to a pale gray or blue ,levels above 25% cyanosis which is unaffected by oxygen administration might occur. Levels above 50% may lead to coma followed by death [12]

A complication of intrauterine procedures is intravasation which involves the passage of fluid filling the uterine cavity into the bloodstream through endometrial vessels (from the myometrial veins to the uterine venous plexuses). This complication presented as greenish blue colored urine followed by which this phenomenon is called the “green urine sign.” Different aetiologies have been reported in the literature with cases of the green urine sign, but rarely were association with chromopertubation was established. Dusak et al. published the four-level intravasation severity classification: level 0 (no intravasation, level 1 : mild intravasation present with minimal invasion limited to the myometrium, level 2 : moderate intravasation involving the venous uterine plexus & occurring slowly, and level 3 :severe intravasation involving the venous uterine plexus and appearing immediately.[6]

In the literature, it was reported that a patient with pelvic tuberculosis had blue urine for six days after an operation performed using methylene blue. [7] Cases of systemic anaphylaxis, pulmonary edema and inflammatory peritonitis have been also reported after the use of methylene blue in laparoscopic chromopertubation.[8,9]

Methylene blue induces methemoglobinemia at doses greater than 7 mg/kg of body weight. But in our case, A total of 20 mg of methylene blue at a concentration of 0.5 mg / ml in 100ml of normal saline and was used in a concentration of 0.5%. Inspite of using a lower concentration and low amount of methylene blue, our patient had developed methaemoglobinuria. This blue coloured urine could have occurred due to extravasation of the dye into the bladder or mild systemic anaphylaxis. Dewachter et al., cutaneous test positivity, confirmed an anaphylactic reaction against methylene blue based on positive skin tests .[10]

Conclusion

Methhaemoglobinuria should not always be considered lightly as a sign of extravasation, this can be an underlying sign of systemic anaphylaxis. For this reason, clinicians should keep in mind that use of methylene blue may also have complications and they should be alert to signs of its toxicity. Only with this approach an early diagnosis can be made and possible worse consequences can be prevented.

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