Safety of vaginal disinfection with 3% alcohol iodine solution after cesarean section: thyroid function assessment in postpartum women with no risk factors for thyroid gland

Bezpieczeństwo odkażania pochwy 3% alkoholowym roztworem jodu: ocena funkcji tarczycy u kobiet bez czynników ryzyka chorób tarczycy

Grażyna Orlicz – Szczęsna, Andrzej Biłan, Jolanta Zdanowska

Department of Internal Medicine, Medical University in Lublin

Abstract

Objective: To prospective evaluate the influences of vagina desinfection with 3% alcohol iodine solution on thyroid function in puerperium women living in areas with iodine sufficient supplementation.

Study design: Thirty one females with no personal and familiar history of thyroid diseases underwent vaginal disinfection with 3% alcohol iodine solution after cesarean section. The study finished twenty eight of them. All females we sampled for TSH and FT4 before cesarean section, after one and three months respectively.

Results: The mean TSH and FT4 levels of analyzed group stayed in laboratory normal range. Fourteen percent of examined puerperium women developed TSH level depresion. One patient expand overt hypothyroidism (3.5%).

Conclusions: Women after administration of large amount of iodine should be under accurate control in puerperium period.

Keywords: iodine solution, puerperium, thyroid gland hormones

Streszczenie

Celem badania była ocean funkcji tarczycy u zdrowych kobiet bez czynników ryzyka chorób gruczołu tarczowego, którym po cięciu cesarskim wykonano dezynfekcję pochwy 3% alkoholowym roztworem jodu. Grupę badaną stanowiło 31 kobiet. Badanie ukończyło 28 z nich. Stężenie hormonów tarczycy i TSH w surowicy krwi oceniano bezpośrednio przed cięciem cesarskim oraz po miesiącu i 3 miesiącach od niego.

Wyniki: U 14% badanych kobiet doszło do spadku stężenia TSH w trakcie badania. U 1 kobiety rozwinęły się objawy niedoczynności tarczycy.

Wnioski: Kobiety, u których zastosowano roztwór jodu w okresie okołoporodowym powinny być obserwowane pod kątem potencjalnych zaburzeń funkcji tarczycy.

Słowa kluczowe: roztwór jodu, okres okołoporodowy, hormony tarczycy

Introduction

In medicine there are widely used medias with large, overphysiologic doses of iodine for both diagnosis and treatment. It was interesting to investigate influence of singe, large iodine dose on hormonal thyroid balance and hypophysis feedback in healthy women with no previous history of any thyroid gland disturbances. Females from Lublin neighborhood were enrolled to our study. This East-Southern Poland region was assumed under iodine successful obligatory supplementation in 1997 [1]. Before it was started, the area had been considered as moderate iodine deficient district. Supplementation with potassium iodide at level 30 mg ± 10 mg per kg table salt eliminated iodine insufficiency in Poland and did not increase hyperthyroidism occurrence [2,3]. In ginaecology, antiseptics with a large iodine amounts, even with several dozens or hundreds of iodine miligrams are widely used. We aimed at assessment of thyroid gland state before application iodine and after one and three months respectively. Such evaluation was also considered as Wolff-Chaikoff mechanism and escape phenomenon determinants considered as defending mechanism against colossal iodine overdose [4]. Our study results can be useful for practitioners and clinicists revealing iodine influence in area after seven years of efficient obligatory table salt iodine supplementation.

Material and Methods

Research was provided from January to December 2004. All women were informed about the aim of the study and consent was obtained. Patients filled up the questionnaire, where they answered to particular ques-

tions about prior personal and familiar history connected with thyroid disturbances. Qualified patients did no take any drugs or vitamins with iodine content. They also did not undergo any procedures with this element for the last 12 months. Three times collecting blood samples for hormonal assessment were performed. Clinical examination and ultrasonography of the thyroid gland was performed with 10 MHz sound of Siemens Sonoline G50. It was taken from 2 to 7 days after delivery, during hospitalization. We excluded subjects with any single changes in thyroid morphology such as cyst, nodules, enlarged volume and echogenity. Enlarged thyroid gland was defined as a volume exceeding 18ml [4]. We qualify 31 women to our study. The average age was 30 ± 5.5 years. There was no age limits. The study finished 28 of them. Average age was 30.4 ± 5.4 years and ranged from 19 to 42 years. They underwent cesarean section with vaginal disinfection with 3% alcohol iodine solution in Department of Obstetrics and Pathology of Pregnancy of Medical University in Lublin. Operation was performed because of children causes, mainly fetuses deccelerations and no delivery progress. The amount of solution used in this procedure ranged from 10 to 20ml. It contained about 0.3-0.6 iodine grams when we assume 100% absorbtion from vagina. It is several thousand times larger dose than daily 150μg advised for pregnant and breast feeding woman They took supplementation during pregnancy at dose of 150 μg iodine according to WHO recommendations [5]. Blood samples for TSH and FT4 were analized with automated quantative enzyme immunoassay using the ELFA technique (Enzyme Linked Fluorescent Assay) of Bio-Merieux concern. We accepted as normal range levels from 0.25 to 5mIU/ml for basal TSH and 8-20pmol/l for FT4. Data for TSH and FT4 were given as median values ± S.D. [6,7].

Statistical Analysis

The collected results were submitted to a statistical study. Repeated measures ANOVA and posthoc analysis with LSD test were performed. P< 0.05 was considered to indicate a statistically significant difference. Statistical computations were executed with Statistica, commercially available Software (StatSoft USA).

Results

Average TSH level was 2.06 ± 1.05μIU/ml and ranged from 0.25 to 4.01μIU/ml in group of 31 women who started examination. Their mean FT4 was 10.4 ± 1.82pmol/l and range from 8.01 to 16.68pmol/l. The collected results from 28 women who participated in all three stages of study were submitted to a statistical analysis. Results are shown in table 1.

Table 1. Average hormone levels in particular measurements

Hormone	Measurement 1 mean±SD [min.-max.]	Measurement 2 mean±SD [min.-max.]	Measurement 3 mean±SD [min.-max.]
TSH (μIU/ml)	2,05±1,10 [0,25-4,10]	1,18±0,62 [0,11-2,42]	1,50±1,15 [0,20-6,11]
FT4 (pmol/l)	10,35±1,87 [8,01-16,68]	10,18±1,10 [8,49-12,95]	9,92±1,33 [7,18-12,67]

There were significant differences for average TSH levels (F=7.8, p=0.001). In LSD test we observed statistically significant differences between initial and second measurement p=0.0002 and between first and third p=0.016. There was no significance between second and third measurement. There was no statistically significant differences between particular FT4 levels (F=0.91 and p=0.4). Mean differences of TSH levels between second and first measurement (TSH 2 – TSH 1) was –0.86 ± 1.23μIU/ml and range from –3.41 to 1.91μIU/ml. At second measurement 22 patients (78.5% of group) decreased serum TSH level and 22.5% increased or not decreased it.

Difference between third and first mean TSH level (TSH 3-TSH 1) was –0.55 ± 1.13μIU/ml range from –3.38 to 2.29μIU/ml. At third measurements in relation to first measurement we observed TSH decrease at 21 patients (75%) and increase at remaining women.

In puerperium women we observed statistically significant decrease in mean TSH level in follow up. All average concentrations were in normal laboratory range. Average FT4 level also decreased in second and third measurement, but differences between particular measurements were not statistically significant. Between twenty eight women who participate in our study we found decreased TSH under the lower border in 4 of them (14% of study group). Two of them decreased it after one month, and two another developed it 3 months after delivery. One patient (3.5%) expand overt hypothyroidism after 3 months and had been treated with thyroid hormone supplementation dose.

Discussion

Most authors evaluated iodine excess influence applied in women on fetus thyroid gland or newborns direct or with reference to iodine concentration in feeding milk [8,9]. Such exposure developed TSH increase even over 20mIU/ml after one week and decrease free thyroid hormones at newborn, especially with low birth weight and premature infants and brought 30% hypothyroidism [10]. Women from Japan after iodopovidone use showed TSH rise at newborn and iodine concentrations in breats milk were very high till 5th day after labour [11]. Also we seen studies which showed TSH level rise in umbilical cord blood after povidone-iodine vagina and umbilical cord disinfection before cesarean section [12]. There are also a lot of studies de-

scribing iodine induced disturbances among children at different age and adults [13]. But we not found studies about thyroid hormonal changes among selected healthy women after iodine containing antiseptics apply during cesarean section from iodine sufficient area, just several years after effective obligatory salt supplementation, which was iodine moderate insufficient district for decades and centuries [1,2]. Iodine is considered by most clinicists as a best local antiseptic against post cesarean related infections and vaginal preparation. Also one knows generally that iodine is an microelement with essential influence on thyroid gland function and morphology. Most cases of iodine induced abnormalities develops among thyroid gland autonomy or predisposition to autoimmunologic thyroid diseases [14,15]. Scientist think that widely use of povidone iodine by practitioners in this period as regrettable and unfortunately but it is still largely apply [16]. Our study was conducted among women with no personal and family history of thyroid diseases and within normal morphology in ultrasound examination. They were on iodine supplementation during pregnancy and puerperium - 150μg at additional vitamin tablet once a day [17]. Data of transient hormonal changes are with high probability connected with overphysiologic dose of applied iodine. We showed that the mean TSH level of examined women group decreased in relation to initial level what was statistically significant in particular measurement. Four women (14% of group) developed subclinical hyperthyroidism and one women proceed overt hypothyroidism (3.5%). The degree of thyroid gland hormonal disturbances was nervousness, losing weight for women who depressed TSH level. But it is difficult to say if it was because of hormonal changes or connected with larger responsibilities to newbrons. No women had developed any depression. Subclinical hyperthyroidism appeared after one month among two women and at remaining after 3 months. These changes were transient, no treatment was necessary. Patients were only observed. Their TSH level returned back to normal laboratory level spontaneously after 1 to 3 months. Hypothyroidism was observed at third measurement after three months observation at women who gain weight and comply at drowsiness. This result is opposite to whole group. It is possible that high dose of iodine provoke her to developed autoimmunogic genetic predisposition not detected by our inclusion criteria, especially that we not assay antithyroid antibodies in this study [18]. Her family and personal history was negative to thyroid gland diseases and her ultrasound examination not shown any abnormalities. Maybe she developed postpartum thyroiditis which start at once as persistent hypothyroidism [19,20]. We found that iodine containing antiseptics with single supraphysiologic dose of this microelement was almost one to four thousand times larger than WHO recommended daily dose [5,17]. It affected incidence of TSH decrease in areas of adequate iodine supplementation. Laurberg study showed opposite results that in such areas subclinical hypothyroidism is more often [21]. It is also well establish that iodine supplementation increase hyperthyroidism incidence [22,23]. But in Poland large population studies did not evaluated higher risk after introduction of obligatory iodization supply in first years [2]. Also described changes can not be considered as result of puerperium recovery because in such stages TSH rises. Also pregnancy can not be consider as a factor due to these changes. In pregnancy first trimester TSH depression is observed even under the lower borderline what is connected with elevated human chorionic gonadotropin (hCG). In second and third trimester it increases. Free thyroid hormones increase in first trimester and after then they decrease but stay in laboratory normal range for not pregnant women [17,24]. At many obstetrics departments gynaecologists use iodine solutions to vagina desinfection, mostly iodopovidone, which contains 10mg iodine in 1ml. It acts very fast and has generally no resistance against micro-organisms. In our research 1ml of alcohol solution contained about 30mg of iodine. So clinicians who use wide iodopowidone treat women only 3 times less dose than ours, but also several hundreds times largest than daily recommended for pregnant and breastfeeding. Practitioners consider that iodine desinfection is the most effective againts post cesarean infections. But many authors revealed that other desinfecants with no iodine have similar efficacy and power against post-cesarean infections or women mortality. Chlorchexidin is one of the example, however contains alcohol as a carrier and contact skin inflammation as side effect can be observed. But side effects of chlorchexidin were found mainly among children and were connected with use on head and neck area [16,25,26,27]. Our study proved that it is not only important to check if women has allergy to iodine as it is done routinely, but also is indicated to take history to thyroid gland diseases.

If history is positive thyroid hormonal function should be checked in puerperium, even in healthy women with not characteristic complaints mainly consider as symptoms of newborns care fatigue.

Conclusions

Women who had swabbed vagina with 3% iodine solution after cesarean section decreased mean TSH level statistically significant in postpartum. Four women developed subclinical hyperthyroidism what determine 14% of examined group. One patient expand over hypothyroidism (3.5%). These data suggest that careful control after iodine contact in women after cesarean section is indicated.

References

1. Szybiński Z., Delange F., Lewinski A., Podoba J., Rybakowa M., Wasik R., et al. A programme of iodine supplementation using only iodised household salt is efficient - the case of Poland. Eur. J. Endocrinol., 2001; 144(4): 331-337.
2. Lewinski A., Szybinski Z., Bandurska-Stankiewicz E., Grzywa M., Karwowska A. Kinalska I. et al. Iodine-induced hyperthyroidism--an epidemiological survey several years after institution of iodine prophylaxis in Poland. J. Endocrinol. Invest., 2003; 26(Suppl.2): 57-62.
3. Aghini-Lombardi F., Antonangeli L., Martino E., Vitti P., Maccherini D., Leoli F. et al. The Spectrum of Thyroid Disorders in an Iodine-Deficient Community: The Pescopagano Survey. J. Clin. Endocrinol. Metab., 1999; 84(2): 561-566.
4. Dohan O., De la Vieja A., Carrasco N. Molecular Study of sodium-iodide symporter (NIS): a new filed in thyroidology. Trends Endocrinol. Metab., 2000; 11(3): 99-105.
5. Delange F. Iodine deficiency in Europe and its consequences: an update. Eur. J. Nucl. Med. Mol. Imaging., 2002; (Suppl.2): 404-416.
6. Demers L.M., Spencer C.A. Laboratory medicine practise guidelines: laboratory support for the diagnosis and monitoring of thyroid disease. Clin. Endocrinol. (Oxf)., 2003; 58(2): 138-140.
7. Baloch Z., Carayon P., Conte-Devolx B., Demers L.M., Feldt-Rasmussen H., Henry I.F., et al. Guidelines Committee, National Academy of Clinical Biochemistry: Laboratory medicine practice guidelines. Laboratory support for the diagnosis and monitoring of thyroid disease. Thyroid, 2003; 13(1), 3-126.
8 Bostanci I., Sarogliu A., Ergin H., Aksit A., Cinbis M., Akalin N. Neonatal goiter caused by expectorans usage. J. Pediatr. Endocrinol. Metab., 2001; 14(8): 1162-1162.
9. Semba R., Delange F. Iodine in human milk: Perspectives for infant health. Nutr. Rev., 2001; 59(8): 269-278.
10. Paravacini E., Fontana C., Paterlini G., Taglianbe P., Rovelli F., Leung K., et al. Iodine, thyroid function, very low birth weight infants. Pediatrics, 1996; 98: 730-34.
11. Harada S., Ichihara N., Arai J., Honma H., Matsuura N., Fujieda K. Influence of iodine excess due to iodine-containing antiseptics on neonatal screening for congenital hypothyroidism in Hokkaido prefecture. Screening 3, 1994; 3: 115-123.
12. Howard R. Appriopriate use of topical antimicrobials and antiseptics in children. Pediatr. Ann., 2001; 30(4): 219-225.
13. Bostanci I., Sarogliu A., Ergin H., Aksit A., Cinbis M., Akalin N.: Neonatal goiter caused by expectorans usage. J. Pediatr. Endocrinol. Metab., 2001; 14(8): 1162-1162.
14. Richards K., Stasko T. Dermatologic surgery and the pregnant patient. Dermatol. Surg., 2002; 28(3): 248-256.
15. Heymann W.R. Potassium iodide and the Wolf-Chaikoff effect: relevance for dermatologist. J. Am. Acad. Dermatol., 2000; 42: 490-492.
16. Reid V.C., Hartman K.E., Mc Mahon M., Fry E.P. Vaginal preparation with povidone-iodine prior to cesarean section did not reduce pospartum infection. Obstet. Gynecol., 2001; 3: 186-187.
17. Glinoer D. The regulation of thyroid function during normal pregnancy:importance of the iodine nutrition status. J. Clin. Endocrinol. Metab., 2004; 18(2) 133-152.
18. Bournaud C., Orgiazzi J. Iodine excess and thyroid autoimmunity. J. Endocrinol. Invest., 2003; 26(Suppl.2): 49-56.
19 Sakaihara M., Yamada H., Kato E., Ebina Y., Shimada S., Kobashi G., et al. Postpartum thyroid dysfuntion in women with normal thyroid funtion during pregnancy. Clin. Endocrinol., 2000; 53(4): 487-492.
20. Roti E., Uberti E. Post-partum thyroiditis – a clinical update. Eur. J. Endocrinol., 2002; 146(3): 275-279.
21. Laurberg P., Bullow Pedersen I., Knudsen N., Oversen L., Andersen S. Enviromental iodine intake affect the type of nonmalignant thyroid disease. Thyroid, 2001; 11(5): 457-469.
22. Diez J.J. Hyperthyroidism in patients older than 55 years: an analysis of the etiology and management. Gerontology, 2003; 49(5): 316-23.
23. Yang F., Teng W., Shan Z., Guan H., Li Y., Jin Y., et al. Epidemiological survey on the relationship between different iodine intakes and prevalence of hyperthyroidism. Eur. J. Endocrinol., 2002; 146(5): 613-618.
24. Lazarus J., Kokandi A. Thyroid disease in relation to pregnancy: A decade of change. Clin. Endocrinol., 2000; 53(3): 265-278.
25. Yilmaz D., Tezic H.T., Zorlu P., Firat S., Bilaloglu E., Kotlu A. Single dose povidone-iodine on thyroid functions and urinary iodine excretion. Indian Journal of Pediatrics, 2003; 70(8): 675-677.
26. Garland J.S., Alex C.P., Otten D., Shivpuri C., Harris M.C., Naples M., et al. A randomised trial comparing povidone-iodine to chlorhexidine gluconate-impregnated dressing for prevention of central venous catheter infections in neonates. Pediatrics. 2001; 107(6): 1431-1438.
27. Morgan J., Haugl R., Kosman J. Antimicrobal Skin Preparation for the Maxillofacial Region. J. Oral Maxillofac. Surg., 1996; 54(1): 89-94.

Correspondence address

Andrzej Biłan
Klinika Chorób Wewnętrznych
Uniwersytet Medyczny w Lublinie
20-081 Lublin, ul. Staszica 16
Tel/fax (+84)815327717
e-mail: andrzej.marek.bilan@gmail.com