Breast cancer is the most common cancer in case of women. Occupation of armpit lymph nodes is considered as the most important prognostic factor for the breast cancer. Currently, the basic form of evaluation of early locoregional stage of breast cancer has become the procedure to remove the sentinel node (1). Frequently, this procedure involves the use of dual methods of imaging: there are used – the radioisotope \(^{99m}Tc\) and one of three blue dyes: patent blue V(Patent Blue V, PVB), isosulphan blue (Isosulphan Blue) or methylene blue (Methylene Blue).

We describe a case of adverse reaction after administration of Patent Blue C dye, consisting of the allergic reaction, mainly limited to skin. In addition to presenting this case is a brief overview of the allergic reaction observed in connection with the use of Patent Blue V dye, which is commonly used in Poland to identify the sentinel lymph node.

CASE REPORT

In 2009, in another hospital, 74-year-old woman had completely cut off tumor from right breast (microscopic diagnosis: papillary carcinoma in the cyst wall, tumor diameter was 7 mm, the expression of hormone receptors for estrogen and progesterone was affirmed, there was no overexpression of HER2).

In the past, in 1994-1995, the patient was treated by surgery and supplements (radio and chemotherapy) because of thyroid lymphoma with intermediate grade. To the time of breast surgery, there was no recurrence of lymphoma.

After excision of breast tumor it was decided to treat with the use of aromatase inhibitor (anastrozole). After about 6 months of treatment, the patient stepped out for consultation to our center. Despite of six months time from the original surgery, the patient was qualified to remove the sentinel lymph node using the dual methods of identification (in accordance with the protocol, which is in force at our center). Approximately 3-4 hours before the operation, she got peri-areolar injection of 0.3 ml radiotracer \(^{99m}Tc\) (media: Nanocis), in the quadrant in which there was a scar after excision of the tumor and approximately 10 minutes prior to surgery, in the same site,
there was injected sc 2 ml of blue dye – Patent Blue V. Immediately prior to surgery, the location of the sentinel lymph node in the right axilla was scintigraphically confirmed.

After oral premedication (7.5 mg of midazolam, 30 minutes prior to surgery) we used a local anesthetic (lidocaine 0.5% 20 ml) and standard way, using gamma camera, we located and excised the sentinel node. The operation proceeded without complications.

About 10 minutes after surgery and 60 minutes after injection of Patent Blue V dye, on the skin of upper half of the chest, we noticed small-follicle rash. Content filling follicles has a distinctive bluish-blue color that matches the color of dye used (fig. 1). In addition, blue discoloration was supple tissue orbits associated with facial swelling (fig. 2) and scar at the base of the neck, after thyroid surgery.

Blood pressure and heart rate remained normal throughout the whole period and from general symptoms, there were observed only a temporary drop in blood oxygen saturation levels to 94%, without accompanying dyspnoea and auscult changes.

We used oxygen therapy 4 l/min, hydrocortisone (100 mg) and dexamethasone (8 mg) intravenously and Antazoline (100 mg) intramuscularly. In laboratory studies (urea, creatinine, electrolytes, AST, ALT, CRP) abnormality was not found.

Over the next two days rash and discoloration of the skin gradually faded away. The patient in good general condition was discharged home. During the first postoperative control visit (four days after surgery) we did not affirmed residual of rash and discoloration and patient did not feel any discomfort.

**DISCUSSION**

To tutorial into clinical practice the procedure of remove the sentinel node, contributed an American surgeon Donald Morton, performing this procedure in case of patients with melanoma. Morton also was the first to identify the sentinel lymph node by applying dyes – Patent Blue V and Isosulphan Blue. In 1994, Giuliano presented the results of sentinel lymph node biopsy in case of patients with breast cancer (3, 4).

The widely used now is the method of double identification of the sentinel node: one of the three blue dyes is injected (Patent Blue V, Isosulphan Blue and Methylene Blue) and media labeled $^{99m}$Tc. The combined use of two identification methods can reduce the false negative rate to less than 1% (2).

Patent Blue V cited above was used already in the 60s of the last century in lymphangiography. This dye is also known as acid blue 3, disulphine blue and E-131 dye, and in Poland as blue food. It is a synthetic dark blue pigment, soluble in water, resistant to light and
Blue skin rash and swelling of the orbits after Patent Blue V dye.

... temperature, which from the chemical side is a compound of calcium or sodium hydroxide, 4-/alpha-4-diethyl-aminofenylo/5-hydroxy-2.4-disulfofenylo-metylideno/2.5-cykloheksandie-no-2.5-1-ylidino diethylamine (the name by International Union of Pure and Applied Chemistry [IUPAC]) (6). In addition to application in medicine and dentistry, it is widely used among others for coloring food, textiles and cosmetics.

Since the beginning of the use of dyes in medicine, there were reported allergic reactions of patients (5). Then the method of using dyes were widely used. Dissemination of procedures to remove the sentinel node, especially in the treatment of patients with breast cancer and melanoma revealed the scale of the problem of allergic reactions.

Recent data come from research of ALAMANAC and NEW START from the UK, based on the nearly 8,000 patients with breast cancer, indicate that the incidence of side effects using PHV pigment in sentinel node biopsy is 0.9% (2). The earlier reports suggest that the proportion of adverse events ranged from 0.24 to 2.2% (5).

Based on data from the UK, they found that up to 94.4% of all adverse events are allergic reactions, which can be divided into four degrees of severity. The most common first reactions is blue rash, itching, urticaria and generalized rash. Temporary drop in blood pressure and bronchospasm or laryngeal reactions are relatively frequent reactions of second degree of severity. Least likely to experienced were reactions of third degree of severity, which is a significant drop in blood pressure requiring supply of vaso-pressors and symptoms causing stop of the procedure and/or admission of intensive care. There were no deaths, cardiac or respiratory arrest (tab. 1).

Very specific of side effect of Patent Blue V dye is the decline of blood saturation measured by pulse oximeter oxygen, which is caused by absorption of light by the dye, causing a false-lowed reading of pulse oximeter (7).

Research suggests that allergic reactions associated with the supply of Patent Blue V are Ig-E dependent. However, not all allergic tests bring positive results. So it is not possible to completely reduce the risk of allergy to Patent Blue V, with preoperative screening allergic tests (8). Potentially, there are also possible allergic reactions to the same dye used i.a. in the food industry, although it has not been recorded, so far (4).

In addition to patent blue for sentinel node biopsy, there are used two different dyes: Iso-sulphan Blue and Methylene Blue. Blue of isosulphan is isomer PBV. The percentage of adverse reactions is at a similar level (0.8-1.9%), however, the dye more often causes a fall in blood oxygen saturation, which is important for patients with respiratory diseases (9). Methylene blue very rarely triggers an allergic reaction, but there are local side effects: skin rashes, subcutaneous tissue necrosis and abscesses at the injection site. In addition, there were also described necrosis and ulceration of the skin, shrinkage and permanent discoloration of the implant after breast reconstruction (9).

**CONCLUSION**

In conclusion, the dye Patent Blue V plays an essential role in identifying the sentinel

<table>
<thead>
<tr>
<th>Severity</th>
<th>Type of reaction</th>
<th>Frequency of incidence of allergic reactions (%)</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>blue skin rash, itching, hives, generalized rash</td>
<td>33.8</td>
</tr>
<tr>
<td>II</td>
<td>transitional moderate decrease in blood pressure, bronchospasm, laryngeal spasm</td>
<td>23.6</td>
</tr>
<tr>
<td>III</td>
<td>a significant decrease in blood pressure, symptoms causing the stop of the procedure, reception to intensive care unit</td>
<td>7.3</td>
</tr>
<tr>
<td>IV</td>
<td>cardiac or/and respiratory arrest, death</td>
<td>0</td>
</tr>
<tr>
<td>Nonspecific reactions</td>
<td></td>
<td>35.3</td>
</tr>
</tbody>
</table>
lymph node and is used more often in Poland, because now it is the standard way of dealing with not advanced breast cancer. The risk of adverse events is small, as is apparent from the review of the literature and does not involve a threat to life. It is therefore not recommended to carry out preventing allergy tests.

REFERENCES

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