Poly Implant Prothèse (PIP)

Compilation of reports from aesthetic plastic surgery clinics

4 June 2013

Medical Devices Unit
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1. Background
On 31 March 2010, the Medical Products Agency decided to ban the silicone gel-filled breast implants produced by the French company Poly Implant Prothèse (PIP). The French competent authority for medical devices, Afssaps, had found that the silicone gel used in the product was different from the gel listed in the technical documentation. Since then, extensive investigations and analyses have been conducted, primarily by the authorities in France and the United Kingdom and by the European Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Investigations have been conducted into, for example, the properties of the silicone gel (biological, chemical, physical) and the clinical picture.

In summary, it has become clear that the implants are of a quality which is inferior to that of other breast implants on the market, and it has been ascertained that there is an increased rupture rate and that the implants can cause local reactions.

2. Purpose and method
The agencies responsible for the supervision of medical devices in the EU have arrived at, somewhat, different recommendations with regard to the follow-up of women who have PIP implants and the measures that are to be taken.

The Medical Products Agency and the National Board of Health and Welfare issued a recommendation concerning PIP implants in November 2010, and made an assessment on in December 2011 that this should remain in force, unaltered. This investigation of the clinical picture regarding PIP implants in Sweden was initiated in order to acquire additional data for the continuous evaluation of whether the recommendation needed to be amended or not. Questions that the investigation sought to answer include: what side effects that have been observed, it is possible to identify a risk group and how many ruptures of the PIP implants have been observed in Sweden?

A questionnaire was sent to each of the 12 clinics that operated in PIP implants, on 12/01/2012 and subsequently on 26/03/2012, with a request that they report all of the PIP implant ruptures and side effects that were recorded by these clinics up to and including March 2012. The questionnaire was also sent, on 26/01/2012, to clinics in the Swedish Association for Aesthetic Plastic Surgery, as patients with PIP implants may have sought alternative private care. The former Swedish distributor of the PIP implants, as well as the bankruptcy trustee, have also been contacted with the aim of retrieving information about, for example lot numbers.

3. Summary of the results
– Reports in the form of answers to a questionnaire have been received from a total of 14 clinics.
– The response rate to the questions in the questionnaire has varied greatly, and the reported results should, therefore, be interpreted with care.
– In total, 4,082 women received PIP implants in Sweden between April 2002 and March 2010.
The total number of reported ruptures of PIP implants is 102 in 88 women, giving a *reported* rupture rate in women of 2.2 %. An increased rupture rate cannot be tied to any specific lot numbers, or to any certain year of manufacture of the PIP implants. It has not been possible to identify any group who have an increased risk of rupture of their PIP implants.

The time from implantation of the PIP implants to removal of a ruptured PIP implant was, on average, 38 months. Of the ruptured PIP implants that have been removed, 93 % were removed within 5 years of implantation.

The most commonly reported symptoms of a ruptured PIP implant are swollen lymph nodes or lumps in/around the armpit, pain, capsular contracture and a swollen breast.

In ruptures for which data were available, about half were, so-called, silent ruptures, i.e. without visible or experienced symptoms.

The most common operative findings in cases where it was known in advance that the PIP implant had ruptured were exudate, enlarged lymph nodes and siliconomas, each of which was frequently present (61, 32 and 23 %). These findings were also present in cases of silent rupture, but they were less frequent.

One report indicated not only a very pronounced inflammatory reaction around the ruptured PIP implant, although no infection could be established, but also that there was an inflammatory reaction on the other side where the implant was intact.

During operations on ruptured PIP implants with the surface finish "TX", the gel of which had a high concentration of D4, it was observed that there was a higher rate (12/32 = 38 %) of discoloured, opaque viscous exudate around the implant, compared with PIP implants with the surface finish "MX" (0/8 = 0 %), the gel of which has a very low or undetectable concentration of D4. Around their PIP implants there was only a thin, clear fluid in the prosthetic cavity.

### 4. Conclusions

- In March 2012, the reported rupture rate in women was 1.7 %, which was assessed to correspond to the actual number of women who had, at that point, been operated on and whose PIP implants had ruptures. Since then, additional ruptures have been reported, giving a reported rupture rate of 2.2 %. This is assessed to be an underestimation of the actual rate, as there has not been any systematic reporting since March 2012.
- It has not been possible to identify any groups that are at an increased risk of rupture.
- PIP implants can cause severe local inflammation.
- About half of PIP ruptures were reported to have been silent, i.e. did not give rise to any symptoms.
- Silent ruptures can also show local inflammation, but less frequently.
- PIP implants containing silicone gel of the type which contains higher concentrations of D4 (octamethylcyclotetrasiloxane) may cause more severe local irritation than implants with undetectable concentrations of D4.
5. Definitions/abbreviations

D4 Octamethylcyclotetrasiloxane, a type of silicone which is present in higher concentrations in some PIP implants, compared with other breast implants on the market.

Exudate Material composed of serum, fibrin and white blood cells that escapes from blood vessels into a superficial lesion or area of inflammation

PIP Poly Implant Prothèse

PIP implant Silicone breast implant from the brand PIP

ppm "parts per million", a unit of measurement used to indicate the concentration of a substance, 1000ppm = 0.1 %

Rupture Split, bursting

Serous fluid A serum-like, protein-rich, none purulent fluid

Siliconoma Silicone which leaks out into the tissues and accumulates, causing a foreign-body reaction leading to an encapsulation of the silicone

6. References

[1] The Medical Products Agency's website, where the investigation reports and information about PIP implants is published: www.lakemedelsverket.se/PIP

7. Results

7.1. Received reports

The questionnaire was sent to the 12 clinics that have used PIP implants. Responses have been received from 11 of these. In addition to this, several other clinics in the Swedish Association for Aesthetic Plastic Surgery have responded, of which three clinics reported that they have had patients from whom they have removed ruptured PIP implants.

The rate of response to the questions in the questionnaire has varied greatly, from a few per cent to 100 %. For this reason, this report does not present results from all questions in the questionnaire, as there are partial gaps in the data and the results presented should be interpreted with care.

7.2. Number of PIP implant ruptures

In the responses to the questionnaire, 83 ruptures in 71 women (71/4082, 1.7 %) were reported, up to and including March 2012. In September 2012, one clinic reported an additional 19 ruptures in 17 women. The total number of reported ruptures is 102 in 88 women. In total, 4082 women have received PIP implants in Sweden, which gives a reported rupture rate in women of 2.2 %.

Since March 2012, several clinics have continued to operate on patients to remove PIP implants, which is why the actual rupture frequency is probably higher than the reported frequency. The reported use of PIP breast implants stretches from April 2002 until March 2010.
Image 1: Two PIP implants which have been removed, one is intact and the other has ruptured.

7.3. **Lot number**

Each PIP implant is labelled with: PIP, volume (XXXcc), lot number, in which the last two digits indicate the year of manufacture, and a serial number.

According to information from the Swedish distributor, the manufacturer delivered to many countries and the implants were imported individually, not by lot. Depending on the sizes of the implants, serial numbers vary between lots. In small lots the serial numbers are 1-250. In the largest lot included in the Medical Products Agency’s investigation, the serial numbers are 1-920.

Of the 102 reported ruptures of PIP implants, there is data on lot number in 96 cases. These represent 81 unique lot numbers. An increase rupture rate cannot be linked to any specific lot numbers. The last two figures in the lot number indicate the year of manufacture. Nor is not possible, with any certainty, to link the rupture rate with any specific year of manufacture, as there is a lack of data on how many PIP implants from each year of manufacture have been used in Sweden.
Image 2: Ruptured PIP implant from one of the Swedish clinics. The labelling can be seen on the surface in the middle of the implant.

7.4. **Time from implantation to removal of ruptured PIP implants**

There are data available on the date of implantation of PIP implants and removal of ruptured PIP implants for 76 ruptures. The time between implantation and removal was, on average, 38 months. Of the ruptured PIP implants that have been removed, 93% were removed within 5 years of implantation.

Diagram 1: Distribution of the time between implantation and removal of the 76 ruptured PIP implants (See Appendix 8.1.)
7.5. Reported symptoms

There are data on symptoms for 30 of the 88 women with reported ruptures of PIP implants. For some of the women, several symptoms are stated. The most commonly reported symptoms are swollen lymph nodes or lumps in/around the armpit, pain, capsular contracture and a swollen breast. Four women with "silent" ruptures stated they had pain which was interpreted as having a cause other than rupture.

Table 2: Reported rate of symptoms associated with PIP rupture

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Number of women (of 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swollen lymph nodes of &quot;knot&quot; in the armpit</td>
<td>13</td>
</tr>
<tr>
<td>Pain in the breast</td>
<td>9</td>
</tr>
<tr>
<td>Capsular contraction</td>
<td>7 of which 4 were specified as Baker III (breast is firm and looks abnormal)</td>
</tr>
<tr>
<td>Swollen breast</td>
<td>3</td>
</tr>
<tr>
<td>Extreme redness</td>
<td>1</td>
</tr>
<tr>
<td>Increased temperature</td>
<td>1</td>
</tr>
<tr>
<td>Lump in the breast</td>
<td>1</td>
</tr>
<tr>
<td>Wound at the edge of the scar</td>
<td>1</td>
</tr>
<tr>
<td>Infection</td>
<td>1</td>
</tr>
</tbody>
</table>

7.6. Silent ruptures of PIP implants

There is information which indicates that, of the 102 ruptures reported in the questionnaire,
- in 31 cases, the rupture was known or suspected before the operation
- in 29 cases, the rupture was "silent". The PIP implant were removed for aesthetic reasons, worry etc. There were no outward signs or symptoms of rupture, the rupture was first discovered during the operation.
- 42 cases lacked data on the indication for the operation or other status or investigative findings which would indicate whether the rupture was known prior to the operation or not.

Where the data were available, about half of the ruptures of PIP implants were, so-called, silent ruptures.

7.7. Operative findings

The operative findings, which were reported from the removal of the 102 ruptured PIP implants, were mainly exudate, enlarged lymph nodes and siliconoma. The exudate is described most frequently as "yellowy-white/opaque/odourless". There were also isolated descriptions of an irritated capsule, breasts which were swollen or forced up and heat gain.
Table 3: The most common operative findings divided by whether the rupture was known/suspected or not known (silent) before the operation.

<table>
<thead>
<tr>
<th></th>
<th>Known/suspected ruptures (31)</th>
<th>Silent ruptures (29)</th>
<th>Not specified (42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exudate</td>
<td>19 (61%)</td>
<td>7 (24%)</td>
<td>10</td>
</tr>
<tr>
<td>Enlarged lymph nodes</td>
<td>10 (32%)</td>
<td>2 (7%)</td>
<td>-</td>
</tr>
<tr>
<td>Siliconoma</td>
<td>7 (23%)</td>
<td>2 (7%)</td>
<td>-</td>
</tr>
</tbody>
</table>

Exudate, siliconoma and enlarged lymph nodes may be the result of inflammatory reactions.

Certain clinics have provided explanted PIP implants for analysis. The PIP implants had two different types of surface finish on the shell. One type was called "textured" and these PIP implant are labelled "TX"; the other type was called "microtextured" and are labelled "MX".

All of the analysed PIP implants in the group "TX" consisted of PIP silicone gel with high concentrations of cyclic siloxanes ([1] see the Medical Products Agency's report on the laboratory analyses of PIP implants) such as D4 in a concentration of 77-134 ppm. During operations to remove ruptured PIP implants belonging to this group, it was noted that, in 12 of 32 (38 %) reported ruptures, exudate was found which was described as "thick/viscous, opaque, yellowy-white/yellowy-brown/yellow/red" without there being any reported infection.

All of the analysed PIP implants in the group "MX" consisted of PIP silicone gel with very low or undetectable concentrations of D4. In this group there were no cases (0/8, 0 %) where exudate, corresponding to the description above, was found during the removal of ruptured PIP implants. There was only thin, clear fluid around the implant. The breast was swollen and tender, possibly indicating inflammation, in only one case.

7.8. Examples of lack of quality in the coating and gel, as well as silent rupture

One clinic has reported one PIP implant that was removed for preventative reasons. In this case there were no symptoms, only a little serous, clear fluid around the PIP implant and no signs of irritation. The outer coating was completely ragged and the gel was not sticking together, but easily splitting up. Analysis of this PIP implant of the "MX" type showed that
the silicone gel was medical grade silicone with a very low concentration of D4 (PIP-Nusil, [1] see the Medical Products Agency's report on the laboratory analyses of PIP implants).

Image 3: Photograph of the PIP implant described above.
IMGH-C-MX-H-430, LOT: 09608

### 7.9. Examples of strong inflammatory reactions to PIP implant

One clinic reported the following case:

"...have not seen such a strong inflammatory reaction before, and with so much fluid formation/exudate" ... "other types/brands of implant have also ruptured, but without causing the same inflammatory reaction" ... "culture came back negative" ... "Broadened anaerobic culture, which was performed on secretion, did not show any growth." "Even in the patient's other breast, where there had not been a rupture, there was quite a lot of exudate, as well as an inflammatory reaction, although not as strong."
There is no information as to whether this PIP implant in this case was of the "TX" or "MX" type, however, judging from the picture of the implant (Image 2), it was the "TX" type.

8. Appendix

8.1. Time to the removal of ruptured PIP implants - table
Table showing the time from implantation of the PIP implant to removal of the ruptured PIP implant. Data for the diagram in section 7.4

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Ruptures</td>
<td>5</td>
<td>13</td>
<td>12</td>
<td>24</td>
<td>17</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>