Restoring abdominal wall defects using textile materials has become, in recent years, the standard in hernia surgery. The evolution of this surgery was and is directly related to the emergence of new polymer structures with high biocompatibility. Their use has resulted in solving the main implications that occur secondary to the relationship between polymer porosity and filamentary type and risk of infection, generating chronic suppurations. In 1997 Amid highlights, for the first time, the importance of a correlation between alloplastic material porosity, biocompatibility and side effects and classifies these polymers in four main groups, according to the tissues’ reaction to their structures and according to postoperative complications[3]. (table 1) In current practice are used four basic materials: polypropylene, polytetrafluoretylene, polyester, polyvinylidene - fluoroiode (PVDF).

Polypropylene is, perhaps, the most popular material used in hernia surgery; it is a hydrophobic polymer having the following benefits: flexible structure, resistance, quick integration into the adjacent tissue structures, resistance to infection due to its monofilament structure, porosity and type of filament, these being the main criteria to be taken into account, especially when intra-operative septic times are expected. In conclusion, the incidence of chronic sepsis can be reduced by choosing, when clinical conditions allow, monofilament macroporous materials less susceptible to chronic infection.

Key words: mesh infection, hernia, mesh porosity, polypropylene, ePTFE, polyester
in the depth of the prosthesis (fig. 2 and 3), resulting in a very good tensile strength.

The disadvantages of macroporous prostheses relate also to the severe inflammatory reaction responsible for the occurrence of adhesions between the viscera and the prosthesis, and intestinal fistulas, even years after the initial surgery [1,2,4-6].

**Expanded polytetrafluorethylene (ePTFE)** is a hydrophobic synthetic fluoropolymer due to the negative load with microporous structure that causes a low inflammatory reaction (fig 4). Due to its microporosity, it does not integrate into the adjacent tissues but it becomes encapsulated and the passage of bacteria in the synthetic structure is enabled while macrophage migration is prevented. Due to this structural feature, the infection occurring in these prostheses cannot be cleaned by the body. In favour of these prostheses stands the low cellular reaction which allows their fitting in the intraperitoneal area, the risk of visceral-prosthesis adhesions being low, the disadvantages being represented by the risk of infection requiring removal of the prosthesis and the absence of tissue integration with granuloma formation that increases the risk of relapse. Their association with a macroporous prosthesis improves the adhesion to the abdominal wall (dual mesh) [4, 5,7, 8].

**Polyester** – it is a multifilament microporous structure which induces, the same as ePTFE, local granulomatous reaction corresponding to each fibre that subsequently confluences, forming a granuloma that surrounds the prosthesis, resulting in a low elasticity scar, increasing the risk of seroma formation and septic complications (fig. 5) [4, 6, 8, 9].

**Polyvinyliden fluoride** - is a polymer with better resistance to hydrolysis and degradation over time and that keeps the elasticity compared to polypropylene and polyester. Foreign body reaction is greatly diminished compared to that induced by polypropylene and strictly runs around polymeric fibers. Low inflammatory response allows the use of these implants in laparoscopic surgery, without having to apply a protective coating to separate the viscera.

### Results and discussions

Prosthesis infection in hernia surgery has an incidence ranging between 2 and 5%, depending on the size of the study group [1,7]. Most studies on the septic risk in the surgery of abdominal wall defects assess risk factors such as: dissection extension, prosthesis size, surgery length, associated diseases etc. that are undoubtedly directly involved in the septic risk of these surgical operations without, however, taking into account, comparatively, the prosthetic materials used.

Modern surgery for abdominal hernias involves the “tension free” fitting of a polymer prosthesis, but until choosing a prosthesis appropriate for each individual case, the surgeon must take into account the patient’s

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<td>II</td>
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<td>III</td>
<td>Microporous (ePTFE)</td>
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<td>IV</td>
<td>submicronic pore/sheets</td>
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**Table 1**

CLASSIFICATION OF PROSTHETIC MATERIALS ACCORDING TO POROSITY (ACCORDING TO AMID)
multifilament microporous materials [10-12]. To avoid using septicity-related operations, it is recommended to choose multifilament microporous threads that are compatible with the abdominal wall structures, which vary according to the surgical procedure to be used, and the characteristics of the prostheses’ polymer structures play a major role in the postoperative evolution and complications secondary to prosthesis fitting. The surgeon’s understanding of the mechanical and structural characteristics of prostheses and the choice of the appropriate material for the surgical procedure to be performed can prevent further complications in the short and long run in relation to the time when the surgery took place.

While hernia recurrence greatly decreased due to prosthetics and a possible relapse can be corrected, a particular problem is represented by chronic infection with long and slow evolution, affecting the quality of life of these patients who, sometimes, because of a minor asymptomatic parietal defect, get to pay with years of suffering because of the use of unsuitable materials or incorrect combination of these materials. Not rare were cases where a properly performed surgery, using macroporous materials, was compromised, in terms of septicity, by using multifilament microporous threads that generated chronic suppurations with long and slow evolution, affecting the quality of life of these patients who, sometimes, because of a minor asymptomatic parietal defect, get to pay with years of suffering because of the use of unsuitable materials or incorrect combination of these materials. Not rare were cases where a properly performed surgery, using macroporous materials, was compromised, in terms of septicity, by using multifilament microporous threads that generated chronic suppurations with evolution over many years (fig. 7).

The surgeon’s choice often relies on tradition and not on studies and clinical evidence. In high septic risk cases or cases where a properly performed surgery, using macroporous materials, was compromised, in terms of septicity, by using multifilament microporous threads that generated chronic suppurations with evolution over many years (fig. 7).

The surgeon’s choice often relies on tradition and not on studies and clinical evidence. In high septic risk cases or cases where a properly performed surgery, using macroporous materials, was compromised, in terms of septicity, by using multifilament microporous threads that generated chronic suppurations with evolution over many years (fig. 7).

Fig. 6 Septic granuloma secondary to the multifilament implant - excision of the prosthesis and fistulous tract.

Fig. 7. Chronic sepsis caused by using multifilament materials (polyester) to fit the prosthesis (marked in a black circle). In the depth of the wound the polypropylene prosthesis integrated in the tissue can be seen.

Conclusions
It should always be borne in mind that the prosthetic material choice is as important as the surgical prosthetic fixing procedure. By knowing the structural properties of polymeric materials and by choosing them according to their porosity and filamentary structure, considering the general conditions of the surgery, the incidence of septic complications secondary to the use of synthetic materials can be reduced.

References

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