

Comment to “A comparison of Progrid® and Adhesix® self-adhering hernia meshes in an onlay model in the rat” Gruber-Blum S, Riepl N, Brand J, Keibl C, Redl H, Fortelny RH, Petter-Puchner AH (doi:10.1007/s10029-014-1258-0)

M. Tabbara¹ · C. Barrat¹

Received: 1 February 2015 / Accepted: 6 March 2015 / Published online: 20 March 2015
© Springer-Verlag France 2015

Dear Editor:

We would like to thank Drs Gruber-Blum et al. [1] for their efforts to compare the two self-adherent meshes used in the current surgical practice of inguinal hernia repair.

The rat model used by the authors is well established and has been described and used by the same authors and other research teams in several previously published studies. However, in their paper the authors used a 0.5 cm lesion to mimic the defect, whereas the same authors, who previously established this model in 2005 [2], advocated the use of a minimum 1.5-cm lesion to mimic a real hernia defect and clearly noted that a smaller lesion would not lead to visible hernia. This would call the whole model used in the current study into question. Regardless of this observation, this model is undeniably inappropriate to assess macroscopic properties of Adhesix® for the many reasons detailed below.

By definition, Adhesix® consists of a mesh impregnated with a self-adhering gel. The self-adhering gel consists of 99 % polyvinylpyrrolidone (PVP) and 1 % polyethylene glycol (PEG). Once in contact with the tissue, the self-adhering gel coating on the polypropylene mesh is activated by heat and moisture and turns into a tacky gel that permits the mesh to stick on both sides. Unlike other methods of “mechanical” fixation, the mechanism

described above requires a minimal contact surface between the mesh and the tissue to create the “gripping effect” that other fixation methods provide. In the small animal model used, the small size of the lesion and correspondingly small contact surface of the mesh with the adjacent tissue (2 × 2 cm) is insufficient to create the shear strength required to prevent migration, which renders this model inappropriate to study the macroscopic properties of Adhesix®.

In addition, the authors did not take into consideration the fact that, in the small animal model, although it is possible to reduce the surface area of the mesh used, it remains impossible to reduce the thickness of the mesh. If a mesh were to be especially tailored for this small defect, its thickness should be 40 times less than the regular mesh used by the authors. The exaggerated thickness of the mesh used could therefore lead to seroma formation, animal discomfort and animal scratching, which would favor mesh dislodgement.

Furthermore, the model consists of creating hernia defects in rats using extensive blunt dissection to raise large skin flaps and then creating a full muscular lesion to mimic an inguinal hernia defect. This extensive tissue manipulation could lead to an acute inflammatory reaction, which is generally associated with local tissue inflammation, significant seroma and bleeding, all of which are usually nonexistent in a typical simple inguinal hernia repair and can cause significant animal discomfort that again could lead to scratching and mesh dislodgement. Bearing in mind that Adhesix® is not recommended in complex inguinal hernia repair [3], and, if used in complex cases supplementary fixation is usually recommended, the current animal model become unsuitable to accommodate the Adhesix® mesh due to the large flaps and the resulting

This comment refers to the article available at doi:[10.1007/s10029-014-1258-0](https://doi.org/10.1007/s10029-014-1258-0).

✉ C. Barrat
christophe.barrat@jvr.aphp.fr

¹ Department of Digestive and Metabolic Surgery, Jean Verdier Hospital, University Paris XIII, Ave du 14 Juillet, 93143 Bondy, France

inflammatory reaction that is usually absent in simple inguinal hernia.

Although seroma due to the above-mentioned reasons might have been too small to be identified, nevertheless any seroma present could have altered the adhesive properties of the mesh. In fact, any adhesive that forms a hydrogel will absorb water from the adjacent tissue, and in the presence of seroma the hydrogel system can become overloaded and therefore lose its adhesive properties.

The authors questioned whether the use of PEG as part of the adhesive gel could have altered the adhesion process due to the anti-adhesive properties of PEG. We would like to clarify that Adhesix® should not by any means be considered as a PEG glue product as PEG constitutes only 1 % of the composition of the adhesive gel whereas the other 99 % consists of PVP, and thus this adhesive gel should not be compared to other 100 % PEG-based sealants.

The abovementioned arguments add to the already published data on Adhesix® that repudiate the authors' discussion and conclusion. In the experimental pig model published by Champault et al. [4], no migration or recurrence was reported; similar results were reported in an observational clinical study published by the same group [3]. Tollens et al. [5] recently published a paper reporting 100 cases of inguinal and incisional hernia repair in which Adhesix® was used; no recurrence occurred within 2 years of follow-up. In our recently presented series of 149 inguinal hernia repairs using Adhesix®, only four patients (2.8 %) had a recurrence after 3 years of follow-up [6]. All

these data encourage the use of Adhesix® as an alternative to regular mesh.

Conflict of interest Declaration of conflict of interest:

M. Tabbara and C. Barrat declares no conflict of interest.

References

1. Gruber-Blum S, Riepl N, Brand J, Keibl C, Redl H, Fortelny RH, Petter-Puchner AH (2014) A comparison of Progrid® and Adhesix® self-adhering hernia meshes in an onlay model in the rat. *Hernia* 18(5):761–769. doi:10.1007/s10029-014-1258-0 (Epub 6 May 2014)
2. Petter-Puchner AH, Fortelny R, Mittermayr R, Ohlinger W, Redl H (2005) Fibrin sealing versus stapling of hernia meshes in an onlay model in the rat. *Hernia* 9(4):322–329 (Epub 2 August 2005)
3. Champault G, Torcivia A, Paolino L, Chaddad W, Lacaine F, Barrat C (2011) A self-adhering mesh for inguinal hernia repair: preliminary results of a prospective, multicenter study. *Hernia* 15(6):635–641. doi:10.1007/s10029-011-0843-8 (Epub 12 July 2011)
4. Champault G, Polliand C, Dufour F, Zioli M, Behr L (2009) A “self adhering” prosthesis for hernia repair: experimental study. *Hernia* 13(1):49–52. doi:10.1007/s10029-008-0419-4 (Epub 23 August 2008)
5. Tollens T, Kennes J, Vermeiren K, Aelvoet C (2014) Prospective, single center, single surgeon's experience with an atraumatic self-adhering mesh in 100 consecutive patients. *Surg Technol Int* 24:178–182
6. Barrat C, Tabbara M (2014) Inguinal hernia repair using self-adhering sutureless mesh: Adhesix™. Three years follow-up with low chronic pain and recurrence rate. *Hernia* 18(Suppl 2):S66