

# *Le Bulletin de la Dialyse à Domicile*

## **BUTTONHOLE : experience and organization**

BUTTONHOLE : conditions requises et expérience

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### **Résumé**

L'hémodialyse à domicile nécessite une autonomie totale de la part du patient, qui se ponctionne tout seul.

A cette fin l'abord vasculaire doit être de bonne qualité et la technique de ponction doit être aisée.

Une approche désormais reconnue, est la technique du « Buttonhole ». Technique facile, elle encourage les patients à poursuivre leur dialyse à domicile.

Mais le risque d'infection de la fistule artério veineuse, lié à la ponction du « Buttonhole », est très élevé.

Cependant cette technique comporte de nombreux points positifs pour la fistule elle-même, pour les patients et pour les équipes.

Nous avons cherché comment améliorer cette technique afin de tenter d'éliminer tout risque d'infection de l'abord vasculaire et de maintenir sa longévité.

Nous présentons notre expérience dans ce domaine.

Mots clés : hémodialyse à domicile, Buttonhole - technique de ponction, éducation du patient

### **Summary**

Home hemodialysis requires total autonomy from the patient, who punctures himself.

To this end, the vascular approach must be of good quality and the puncture technic should be easy to handle.

A recognized approach is the "Buttonhole" technique. An easy technique, it encourages patients to continue their dialysis at home.

But the risk of arterio-venous fistula (AVF) infection related to the puncture of the "Buttonhole" is very high. However, this technique has many positive points for the AVF itself, for the patients and for the caring teams.

We looked for ways to improve this technique and eliminate as much as possible the risk of infection and to maintain the functionality of the fistula. We present our experience in this field.

Keywords : Home hemodialysis, Buttonhole - puncture technique, patient education

## INTRODUCTION

Currently 7689 Belgians suffer from chronic renal insufficiency requiring treatment by dialysis (hemodialysis or peritoneal dialysis) in hospitals or at home. (1) In Belgium, between 2016-2019, home hemodialysis has undergone a real revolution.

Several factors have had a considerable impact on its expansion.

- The agreement of August 1, 2006 defining a new funding grid for hospitals and doctors corresponding to the savings objective imposed by the Minister of Health, Maggi De Block. By December 31, 2017, it is the obligation of each hospital committed by contract to treat at least 40% of its patients via alternative treatment of renal function replacement, including autodialysis and nocturnal hemodialysis. (2)
- The arrival on the market of monitors for home hemodialysis that are easy to install and more accessible to use.
- Everyday life, including communication and information have evolved; the demands of patients has evolved as well.

All this has increased the tendency to refer patients to home hemodialysis. To make this possible -- guaranteeing the safety of patients and giving patients total autonomy -- the role of nurses and medical staff is essential. Coordination and communication between the various professionals involved in this process, inside and outside the hospital, and with the patients have proved to be one of the keys to success.

Arterio Venous Fistula (AVF) puncture is sometimes more complicated for caregivers and patients than catheterization, especially if the fistula is of poor quality. If patients are stressed and afraid, they prefer to use the catheter for their dialysis. However, it is scientifically proven that when choosing vascular access, the efficiency of dialysis and the safety of patients, the AVF must always be preferred over the catheter. (3) (4) Our role is to educate caregivers and patients, clearly communicate the advantages and disadvantages of these two techniques and guide them to make the right choice. The success of a hemodialysis session depends largely on the quality of vascular access.

It is very important to provide the patient proper vascular access that is easy to use. The team of nurses plays the crucial role in teaching the patient a simple, reliable technique that guarantees the start of a successful dialysis session. A successful session is one without accidents,

risks, fears or anxiety by the patient. According to our experience, the «Buttonhole» technique corresponds very well to these criteria. The technique consistently punctures in the same puncture orifice while respecting an identical subcutaneous course towards the vessel, according to the fibrous tunnel realized progressively. To avoid any risk of infection and to obtain a well-formed «Buttonhole,» it is imperative to perform the procedure properly and to follow all the steps before and during its execution.

## ORGANIZATIONAL AND TECHNICAL RECOMMENDATIONS

Based on the literature, we first applied the «Buttonhole» procedure as it is usually described. (5) (6) (7) (8) (9) However, practice has allowed us to observe that a simple application of this procedure is not sufficient. To obtain a well-formed «Buttonhole» without false routes or the risk of infection, it is necessary to take into account other elements.

Figure 1 displays the organizational procedure that we have developed: our «Buttonhole» procedure is in the center is. (10) (11)

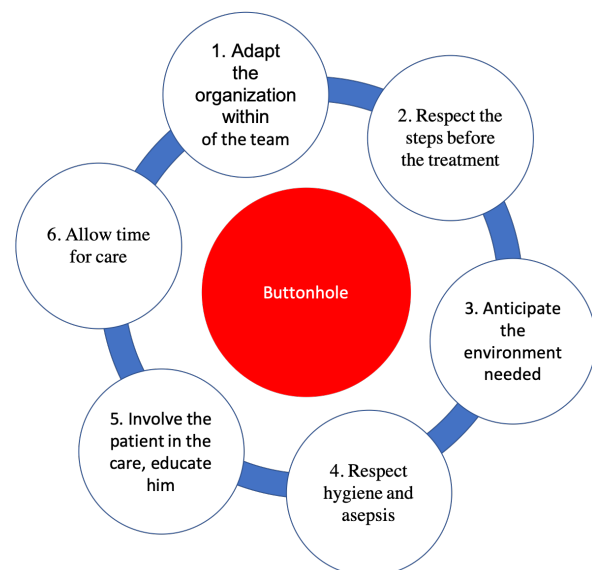


Figure 1 : Requirements for implementing the «Buttonhole» technique successfully

### 1. Structure the team for success (or Shape the team for success)

In our Center, the team is versatile, all working in the both the hemodialysis center, PD and home hemodialysis (HHD). This versatility allowed the team to expand their

knowledge, improve communication, understanding and collaboration. Above all, it has increased the possibilities of taking charge of the creation of the «Buttonhole» by a nurse. In the team, it encouraged motivation and interest for this technique.

## 2. Respect the steps before the treatment

It is a procedure that must be scrupulously planned before starting it. It's important to choose a favorable period for the patient and the team. The patient must be present at the Center during the creation of the «Buttonhole.» You must appoint a dedicated nurse available for 3 weeks to perform this treatment and inform the team.

The patient receives information about the «Buttonhole» procedure, its advantages and disadvantages.

The team prepares the «vascular access» file: the «FAV surveillance» sheet, the latest FAV ultrasound results, the FAV's fabrication drawing made by the surgeon and the history of the FAV.

## 3. Plan for needed time and equipment

It is essential to plan time for patients to wash their hands and AVF, to explain techniques for softening scabs and to put equipment and products at their disposal.

The products and equipment for puncture should also be available to patients so that they feel involved in the care.

## 4. Respect of hygiene and asepsis

Before the puncture, the nurse washes and disinfects his/her hands. The nurse observes the patient's arm and AVF looking for any lesions and signs of infection (heat, redness, pain).

The nurse performs the physical examination of the FAV: emptying, palpation, auscultation.

The nurse defines the points of puncture.

During the puncture, the nurse and the patient wear a mask. The disinfection of the hands is scrupulously respected.

For the puncture, the nurse puts on the sterile gloves and performs a large disinfection of the FAV. For self-puncture, the patient also wears sterile gloves.

After the puncture, the needles are attached by the double tie made with sterile adhesives prepared in the puncture set. The point of the needles is covered with sterile compresses.

If this is the second puncture, the nurse removes crusts with sterile plastic devices and on the puncture points applies an absorbent pad impregnated with alcohol for

30 seconds.

## 5. Involve the patient in the care, educate the patient about the procedure

The nurse works in cooperation with the patient during the necessary time for the creation of the «Buttonhole.» The patient receives all the information concerning the procedure: its advantages and disadvantages, the precautions to be adopted and the equipment to be used. The nurse gives the patient information on the risk of infection of the AVF and makes him/her more aware.

The patient is invited to observe the punctures, as it will be a better guide for a nurse who does not know his/her fistula and may become a good candidate for self-puncture.

## 6. Allow time for care

The patient should be punctured in a calm and appropriate environment. Quality of care is important, not speed. The designated nurse should be relaxed and focused on the care. The nurse always has a colleague next to him/her to provide support, assistance in case of any problems and to share advice.

To achieve greater participation, the patient should feel involved and included as a member of the team.

The creation of the «Buttonhole» must be the priority care for the team working in the theater. The designated nurse must take the time to respect these elements by cooperating with the patient and the team during the entire period of the execution of the technique.

A properly formed «Buttonhole» result in comfort and safety for the team and the patient.

Our technique to make the Buttonhole:

The technique of the «Buttonhole» starts with the creation of a canal in the fistula using sharp needles (Figure 2), repeated punctures always in the same place, at the same depth and at the same angle.

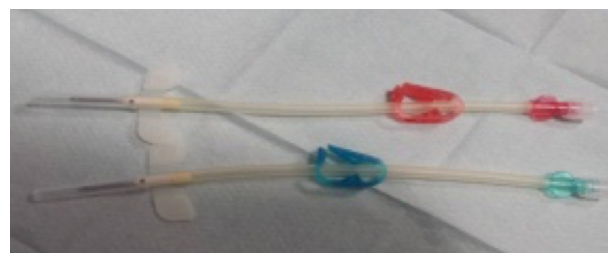


Figure2. Sharp hands to create the channel

Once the creation of the tunnel is complete, the punctures are performed with foam needles (rounded) (Figure 3) by sliding each time in the same channel.



Figure 3. Foam needles with plastic devices to remove crusts

The period of constitution of the canal varies for each patient. It depends on the speed of healing and the quality of the tissue. In general, it takes 6 to 9 punctures (three per week).

During this period, it is preferable the same nurse performs the puncture to avoid any risk of forming multiple paths.

The rules of hygiene and asepsis are rigorously respected. At the center, the patient washes his FAV with neutral soap before the puncture.

The crusts of the previous puncture are brushed with the sterile surgical brush. To soften the crusts, they are covered with a compress soaked in antiseptic soap Dermianose Scrub Chlorexidine 4%. Prior to removal, using sterile plastic devices (Figure 4), the FAV is largely disinfected.



Figure 4. Sterile plastic devices, available in individual packages

Avoid using sharp-edged metal needles to remove crusts. They hurt the orifice of the canal and promote infection.

On the tunnel openings, free of crusts, an absorbent pad impregnated with 0.2% alcoholic Chlorexidine is applied for 30 seconds. Then it is removed while still largely disinfecting the FAV. This allows prolonged, more efficient disinfection and, at the same time, removes any remaining small particles after crust removal. This step

is very important to protect the FAV from a possible infection.

As soon as the sharp needles slide without any resistance in the tunnels, the nurse punctures the AVF with foam needles.

In our Center, to preserve the FAV, we avoid using the synthetic tourniquet to puncture it. Often the patient does the tourniquet with his/her hand during the creation of the «Buttonhole.» In general, as soon as it is created, the tourniquet is no longer necessary.

The foam needle must be introduced into the canal using small rotational movements by holding it by the tubing and not by the fins. Thus the needle takes direction naturally without being pushed or directed by our motions. (Figure 5)



Figure (5) How to hold the needle when introducing it into the tunnel

The last puncture is performed in the presence of the team. The designated nurse explains the position of the arm, the puncture angle, the depth and direction of the tunnel.

From this point, each member of the team can puncture the FAV and the patient can begin self-puncture training. The learning time depends on his/her abilities and his/her pace.

Each patient is trained by the designated nurse for the creation of his/her «Buttonhole.» Relaying is possible because each nurse in the team is trained to perform the «Buttonhole» technique and to train patients in self-puncture and self-branching of the catheter.

Before each puncture, monitoring of the «Buttonhole» points is required.

The nurses observe them and teach the patients to observe them carefully and to detect any changes: heat, pain, color and orifice diameter. Every suspicious sighting should be reported immediately to the nurses in order to take appropriate action. All puncture problems should be reported and evaluated as well.

## RESULTS

The distribution of our vascular approaches is as follows:

- in the center: 28 patients are punctured using the «Buttonhole» and 7 are connected via the Hickman catheter
- at home: 6 patients are punctuated using the «Buttonhole» and the 1 is connected via the Hickman catheter

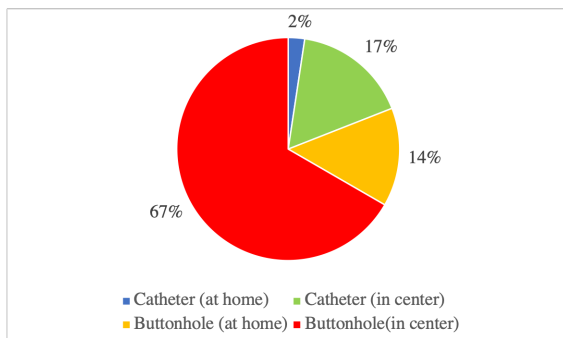


Figure 6 : Distribution of vascular access and puncture techniques in DEH at Erasmus Hospital

No puncture failed, no hematoma or infection was observed.

In addition, the patients sense less pain during the puncture and they are less anxious. They have more freedom of movement during dialysis because there is less risk of accidents with foam needles. The patients know that self-puncture extends the life of FAV. The puncture does not scare them; indeed, it is only necessary to slip, without forcing, the foam needles into the previously-created tunnels

## DISCUSSION

The technique of the «Buttonhole» has always intrigued us with its ease of execution and the comfort that it brings to the patients and to the team. We are always struck by the cleanliness of this treatment: little or no bleeding, non-aneurysmal FAVs barely visible from a distance, without hematomas. The calm and confident approach of the professionals is remarkable as is the cooperation of the patients. The patients feel responsible for their vascular access. They explain the path of the puncture. They respect the training provided by the caregivers.

In all publications, the risk of FAV infection linked to the «Buttonhole» technique is at the forefront. But it should also be noted that in all these works, the positive points, not negligible of this technique, are noted for the FAV itself, for the patients and for the teams.

The decision is very difficult to make, often shared, but nobody excludes this technique from his/her practice.

In 2016, Mrs. Labriola and Mr. Jadoul published an article on this subject. (9)

They reported numerous studies showing that FAV infections punctured by the «Buttonhole» are significantly more common than other techniques. This technique seemed dangerous to them but, at the same time, they underlined its many advantages and did not discourage it. They particularly insisted on the respect of the protocol concerning this technique to avoid a risk of higher infection. They stressed the need to monitor the infection rate. They clearly expressed «... that the widespread use of the 'Buttonhole' technique is not justified.»

As stated at the beginning of this article, the «Buttonhole» technique must be performed in a suitable setting, allowing appropriate time and following the procedure exactly.

It is useless to try this technique when the turnover of nurses on the team is frequent. When the nurses must hurry to connect the patients, when the creation of the «Buttonhole» is not organized, when the punctures are not supervised, when cooperation and patient education are impossible.

Under such conditions, it is impossible to obtain a real benefit from this technique. On the contrary, it is a high source of infections.

The execution of this technique requires time. The removal of crusts is a crucial step. We must first prepare the crusts, as we described in the procedure, to remove them without any trauma to the FAV.

The crusts must be removed completely, without leaving any particles. It is one of the biggest sources of infection if one of these particles is introduced with the needle into the canal and pushed to the bloodstream. For this step, the nurse must be particularly focused, having the necessary time to perform the procedure correctly.

This is an ideal technique for hemodialysis patients at the center and at home.

Our patients receive a very broad and complete education regarding asepsis and hygiene, during the creation of the «Buttonhole.» This education is further enhanced during self-puncture training. Patients are informed about the possible infection of a FAV with a description of all possible consequences. The caregivers are very careful to provide accurate information.

We make a home visit once a month. This is an opportunity to observe the procedure that patients perform in their environment.

Patients are seen at the Center for their medical visit once every 6 weeks. They are interviewed by the nurses about the technique, dialysis in general and problems that may have occurred. At every encounter with the patient, a physical examination of the FAV is performed.

Given the advantages of this technique for the FAV itself, for the patients and for the teams, we are convinced that it is not necessary to abandon it. On the contrary, it is necessary to develop it, to improve it, to provide the autonomy and freedom to patients.

But we must carefully evaluate whether the environment and the organization of work allow this procedure to be performed without any danger for patients.

By being very attentive and careful, it is possible to reduce, even to avoid, the risk of infection caused by this technique, as demonstrated by the results we obtained in our Center. However, the successful execution of this technique depends on the integrity of each professional and the motivation of the team.

## CONCLUSION

Given the advantages, the «Buttonhole» technique is the first choice in our Center. It is feasible in all cases on the condition that the FAV is well-made. It is a less traumatic puncture for FAV; it lengthens its life and decreases the weakening of its wall. It is ideal for FAVs that are difficult to puncture, sinuous, young. It reduces post-dialysis bleeding time and puncture failures.

This technique promotes hemodialysis at home.

Patients are not afraid of choosing the puncture points, failing the puncture, injuring the AVF, causing bruising and excessive bleeding during the puncture.

But the process of creating the «Buttonhole» is very demanding on the team. It is a technique that requires a strict organization, a meticulous respect of the procedure and a close cooperation with the patient.

## CONFLITS D'INTERET

*The authors declare that they have no conflict of interest for this article.*

## BIBLIOGRAPHIE

1. « Réforme des normes et du financement de la dialyse. Position du CA du GNFB. »  
available at : [https://organesdeconcertation.sante.belgique.be/sites/default/files/documents/nationale\\_raad\\_voor\\_ziekenhuisvoorzieningen-fr/cneh\\_d\\_437-1\\_-\\_annexe\\_2\\_-\\_normes\\_](https://organesdeconcertation.sante.belgique.be/sites/default/files/documents/nationale_raad_voor_ziekenhuisvoorzieningen-fr/cneh_d_437-1_-_annexe_2_-_normes_)

dialyse\_ca\_gnfb\_df\_2\_3.pdf

2. « Convention avec l'hôpital «NOM» relative au financement de la dialyse »

Institut National d'Assurance Maladie-invalidité, Service des Soins de Santé, Avenue de Tervuren 211, 1150 Bruxelles  
Davailable at : <https://www.inami.fgov.be>

3. « Grandeur et Dangers des Cathéters Veineux Centraux. »  
Dr. M. François, CHRU,  
Hôpitaux DE Tours, SFAV, juin 2016  
available at : [www.sfav.org](http://www.sfav.org)

4. « Quels sont les différents abords vasculaires d'hémodialyse ? » SCVE Société de  
Chirurgie Vasculaire et Endovasculaire de Langue Française, 2019  
available at : <http://www.vasculaire.com>

5. « Piquage de la fistule artério-veineuse : Avantages et Inconvénients de la méthode de la boutonnière » B. Gombert, 19/07/2014  
available at : <https://nephrologie.wordpress.com>

6. « Fistula First : Vascular Access Update, Continuing Education », « The Buttonhole Technique for Arteriovenous Fistula Cannulation », Lynda K. Ball, Nephrology Nursing Journal, May- Juin 2006, vol.33 No.3  
available at : <http://scholar.google.be>

7. « Canulation in haemodialysis : rope-ladder or buttonhole technique ? »  
Annemarie M. Verhallen, Menno P. Kooistra, Brigit C. Van Jaarsveld, Nephrology Dialysis Transplantation, Volume22, Issu 9, Septembre 2007, pages 2601-2604,  
available at : <https://doi.org/10.1093/ndt/gfm043>

8. « The salvage of aneurysmal fistula utilizing a modified buttonhole cannulation technique and multiple cannulators »  
Rosa M. Marticorena, Joyce A. Hunter, + 4 auteurs  
M. Bolocan Goldstein, 2006  
available at : <https://doi.org/10.1111/j.1542-4758.2006.00094.x>

9. « Moderator's View :Buttonhole cannulation of arteriovenous fistulae : great caution is warranted » L. Labriola and M. Jadoul, Department of Nephrology, Clinique Universitaires Saint-Luc, Université catholique de Louvain, Brussels,Belgium, 2016  
available at : <https://www.ncbi.nlm.nih.gov>

10. « Buttonhole, une technique de ponction en auto dialyse »  
K. Charytoniuk , DEH Erasme  
available at : <http://www.rdplf.org/biblio/category/30-fistule-et-catheter.html>,  
on the RDPLF web site in the section protocols (the identifier and password are known by centers or available at the secretariat of the RDPLF).

11. « Ponction en « Buttonhole » pratique en DEH à l'hôpital

Erasme » K. Charytoniuk ,  
23ème Cours Congres de la Societé Française de l'Abord-  
Vasculaire,  
Available at : [www.sfav.org](http://www.sfav.org)

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