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"Buddy wire" for facilitation of femoral venous access for cryoablation: a preliminary report

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Abstract

Background: Some electrophysiological techniques, such as balloon cryoablation, involve the use of steerable sheaths of large diameter (outer diameter 15 Fr or more). Their introduction to the femoral vein may be difficult, especially in patients who have had numerous venipunctures in this area.

Aim: The authors describe a modification of typical venous access with the use of a "buddy wire" technique, facilitating the insertion of the cryoablation sheaths to the femoral vein.

Methods: A case-control study. The study involved a retrospective analysis of 27 consecutive procedures of balloon cryoablation of pulmonary veins performed in 2015 by the first author, compared to 23 consecutive procedures of balloon cryoablation performed in 2014 without a "buddy wire" technique. The study and control groups did not vary significantly. There were 11 women in both groups. The average age of the patients was 55.9 years. The "buddy wire" technique was the only difference in procedure performance between the control and study groups. In the study group a short introducer was inserted through a puncture of the right femoral vein, and then two wires were introduced through it. One of them was secured, so that it could not move, while the other served as a typical trans-septal puncture monitored with the use of X-ray. The standard trans-septal sheet was replaced with a 15 Fr steerable sheath, inserted through the same puncture site next to the secured "buddy wire". The short wire was then removed from the femoral vein. Typical balloon cryoablation of pulmonary veins was performed. After the end of the procedure, the puncture site was secured with a haemostatic suture for 12–18 h.

Results: Femoral access with a 15 Fr steerable sheath and cryoablation were safely performed in all patients in the study group and in 22 out of 23 in the control group (100% vs. 95.6%, p = NS). Pulmonary vein isolation in one patient was performed using another technique. No damage to steerable sheaths was observed. There were no vascular complications requiring extended hospitalisation, blood transfusion, or surgical interventions in either group. The "door-to-door" time of the procedures ranged from 2 h 32 min on average in the study group to 2 h 43 min on average in the control group (p = NS). There was significant reduction in fluoroscopy time: 7 min 15 s on average from 11 min 25 s (p = 0.0009).

Conclusions: The use of the "buddy wire" technique may lead to significant reduction in fluoroscopy time during cryoablation of pulmonary veins by facilitating the insertion of the steerable sheaths to the femoral vein.

Key words: femoral venous access, "buddy wire", "cutting wire", steerable sheaths, cryoablation

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INTRODUCTION

Some electrophysiological techniques, such as balloon cryoablation, involve the use of steerable sheaths of large diameters (outer diameter 15 Fr or more). It may be difficult to introduce them into the femoral vein, especially in patients who have had numerous venipunctures in this area. The specific structure of the sheath, which enables bending of the distal end, facilitates manoeuvring in the heart chambers, but decreases the stiffness of the sheath. Additionally, the blunt ending of the sheath, which prevents damage to the heart wall, makes the edge of the sheath less smooth, especially in the case of large-diameter sheaths. The application of a large force while introducing such a sheath may result in an uncontrolled dislocation and damage to the vessels and surrounding tissues. The problem may be partially resolved by predilatation of the puncture site with an introducer of larger diameter.

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Unfortunately, sometimes even with this technique, obtaining venous access can be very difficult. The need for a more efficient method of sheath introduction, requiring less force, provided the motivation to modify the existing method with the use of the techniques described and used earlier for other types of procedure [1–3].

The authors describe a preliminary report of the modification of typical venous access with the use of a "buddy wire" technique, facilitating the insertion of cryoablation sheaths to the femoral vein.

METHODS

This was a case-control study of 27 consecutive patients scheduled for a balloon cryoablation of pulmonary veins performed in 2015 by the first author with the use of the modified technique of obtaining venous access. The control group consisted of 23 consecutive patients treated with balloon cryoablation performed in 2014 without a "buddy wire" technique. The study and control groups did not vary significantly. There were seven women in the study and four in the control group (25.9% vs. 17.4%, p = NS). The average age of the patients was 55.4 ± 12.4 years in the study and 56.4 ± 10.0 years in the control group (p = NS).

Because of the use of typical equipment in accordance with its intended and registered use, and techniques described and used earlier for other vascular procedures, no additional consent of the Bioethics Committee was applied for.

The electrodes to the coronary sinus and the bundle of His were introduced via the puncture in the left femoral vein. As a preparation for trans-septal access, a short introducer was inserted through the puncture of the right femoral vein, and then two guidewires were introduced through it (typically 23 cm and 180 cm). After the removal of the introducer, one of the guidewire was secured against dislocation, and the long guide wire was used to make a typical trans-septal puncture monitored with X-ray (Fig. 1). After introduction of the long guidewire to the left superior pulmonary vein, the trans-septal introducer was replaced with a 15 Fr steerable sheath, inserted through the same puncture site next to the secured guidewire (Fig. 2). The short guidewire was then removed from the femoral vein. After introduction of the steerable sheath and the cryoballoon to the left atrium, typical pulmonary vein ablation was performed. After the end of the procedure, the puncture site was secured with a haemostatic suture for 12–18 h. Antithrombotic treatment with vitamin K antagonists was not interrupted, and international normalised ratio was maintained in the range of 2 to 3. In the patients treated with non-vitamin K antagonist oral anticoagulants, the last dose was administered 24 h before the procedure, and the therapy was reintroduced up to 6 h after the procedure. Antithrombotic treatment with heparin was conducted in accordance with the typical scheme, with the monitoring of activated clotting tine, without reversing the effect of heparin at the end of the procedure [4, 5].

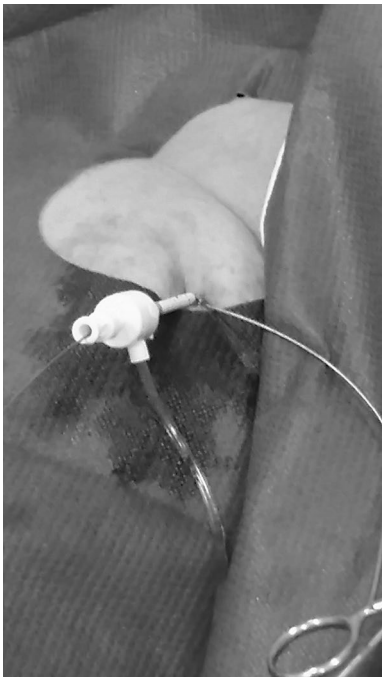

Figure 1. Puncture site with the trans-septal introducer next to the secured wire in the femoral vein

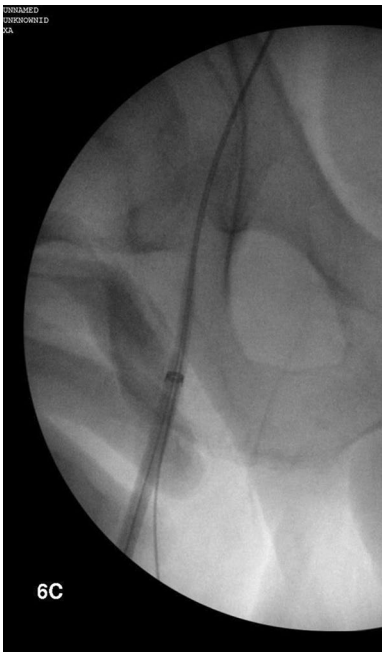

Figure 2. Insertion of the steerable trans-septal introducer next to the secured wire

RESULTS

Femoral access with a 15 Fr steerable sheath and a cryoablation were safely performed in all patients in the study group and in 22 out of 23 in the control group (100% vs. 95.6%, p = NS). Pulmonary vein isolation in one patient was per-

formed using another technique using a standard 10 Fr trans-septal sheet. No damage to steerable sheaths was observed. In both groups, there were no vascular complications requiring extended hospitalisation, blood transfusion, or surgical interventions. The "door-to-door" time of the procedures ranged from 2 h 32 min on average in the study group to 2 h 43 min on average in the control group (p = NS). There was significant reduction in fluoroscopy time in tghe study group, reaching 7 min 15 s on average compared to 11 min 25 s in the control group (p = 0.0009).

DISCUSSION

As electrophysiological procedures become more and more popular, femoral venous access is more frequently used. Some of these procedures are performed with steerable sheaths of large diameter. Their characteristic structure, with a relatively soft and easily bending end, impedes their introduction to the femoral vein. This applies especially to patients with a history of previous procedures performed from that venous access. Soft tissue adhesions make it necessary to use relatively large forces to introduce the sheaths. One of the techniques facilitating their introduction through the puncture is predilatation with a short large diameter sheath, for example 14 Fr [1, 6, 7].

The technique of a "buddy wire" was described both in the case of difficult procedures on coronary vessels and the facilitation of the introduction of trans-septal sheaths through the frail interatrial septum [8–10].

Leaving the short wire in the femoral vein for the introduction of the steerable sheath reduced the need to apply force while introducing the steerable sheath to the femoral vein, probably thanks to greater rigidity at the venous access site and gentler dilation of the puncture site. However, it is difficult to assess the magnitude of this force because it is a subjective feeling.

The success rate in femoral access did not vary significantly between the two groups. However, the lack of possibility to access the femoral vein with a steerable sheet in one patient in the control group in 2014 was probably due to previous ablation in that patient. To avoid potential damage to the groin, another pulmonary vein isolation technique was used.

The shortening in the fluoroscopy time may indicate that it was unnecessary to control the insertion of the steerable sheet. However, other factors may influence the result as a learning curve effect, but in this retrospective analysis we did not have enough data to describe that. The total procedure time did not change during the study, probably due to the rather small proportion of venous access time in the total procedure time.

The use of typical equipment available in the electrophysiology room in accordance with its intended use is a significant factor in the popularisation of the method.

It seems that the technique described above may be used also for other types of steerable sheaths of large diameter. In the opinion of the authors, it can be especially important for physicians with little experience in this type of large-diameter sheath.

Limitations of the study

A significant limitation to this study was its retrospective character and related difficulties. Furthermore, the preliminary character of the findings, the small number of patients, and only the historical control group enabled the formation only of preliminary conclusions.

CONCLUSIONS

In the opinion of the authors, the use of the "buddy wire" technique led to significant reduction in fluoroscopy time during cryoablation of pulmonary veins by facilitating the insertion of the steerable sheaths to the femoral vein.

Conflict of interest: *none declared*

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„Wspierający prowadnik" dla ułatwienia udowego dostępu żylnego do krioablacji balonowej: raport wstępny

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Streszczenie

Wstęp: Niektóre z technik elektrofizjologicznych, np. do krioablacji balonowej, wykorzystują naczyniowe koszulki sterowalne o dużej średnicy. Wprowadzenie ich do żyły udowej, zwłaszcza u pacjenta po wielokrotnych nakłuciach naczyń w tej okolicy, może sprawiać istotne trudności.

Cel: Celem pracy było opisanie modyfikacji typowego dojścia żylnego z wykorzystaniem techniki „wspierającego prowadnika" dla ułatwienia wprowadzania koszulek do krioablacji do żyły udowej.

Metody: Badanie miało charakter kliniczno-kontrolny. Przeprowadzono retrospektywną analizę kolejnych 27 zabiegów krioablacji balonowej żył płucnych wykonanych w 2015 r. przez pierwszego autora. Grupę kontrolną stanowiły 23 zabiegi wykonane w 2014 r. przez ten sam zespół, podczas których nie wykorzystywano techniki „wspierającego prowadnika". Grupa badana i kontrolna nie różniły się istotnie pod względem cech demograficznych. Pacjenci byli w wieku średnio 55,4 roku w grupie badanej i 56,4 roku w grupie kontrolnej. Wykonanie zabiegu w grupie badanej i kontrolnej różniło się jedynie wykorzystaniem „wspierającego prowadnika". W grupie badanej poprzez nakłucie prawej żyły udowej wprowadzano krótki introduktor, a poprzez niego dwa prowadniki. Krótki prowadnik pozostawiano w pachwinie i zabezpieczano przed przesunięciem, natomiast z wykorzystaniem długiego prowadnika wykonywano typowe nakłucie transseptalne pod kontrolą skopii rentgenowskiej. Następnie wymieniano standardową koszulkę transseptalną na koszulkę sterowalną 15 F, przeprowadzając ją przez jedno miejsce wkłucia obok pozostawionego w pachwinie prowadnika. Następnie usuwano krótki prowadnik z żyły udowej. Wykonywano typową krioablację balonową żył płucnych. Po zakończeniu zabiegu miejsce wkłucia zabezpieczano szwem hemostatycznym na okres 12–18 h po zabiegu.

Wyniki: Koszulki transseptalne o dużej średnicy wprowadzono bez powikłań u wszystkich pacjentów z grupy badanej i u 22 osób z grupy kontrolnej (100 *vs*. 95,6%, p = NS). U 1 chorego przeprowadzono ablację żył płucnych inną techniką. Nie zaobserwowano uszkodzeń koszulek sterowalnych. U żadnego z pacjentów nie stwierdzono powikłań naczyniowych wymagających przedłużonej hospitalizacji, przetoczeń krwi czy interwencji chirurgicznej. Czas trwania zabiegu *„door-to-door"* wynosił średnio 2 h 32 min w grupie badanej i 2 h 43 min w grupie kontrolnej i nie różnił się istotnie między grupami. Wykazano skrócenie czasu fluoroskopii z 11 min 25 s w grupie kontrolnej do 7 min 15 s z 11 min 25 s w grupie badanej (p = 0,0009).

Wnioski: Wykorzystanie techniki „wspierającego prowadnika" sprzyja skróceniu czasu fluoroskopii w takcie zabiegów krioablacji balonowej żył płucnych poprzez ułatwienie wprowadzania koszulek sterowalnych do żyły udowej.

Słowa kluczowe: udowy dostęp żylny, *„buddy wire"*, *„cutting wire"*, koszulki sterowalne, krioablacja

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