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Research Article

What Complications for Tunnelled Haemodialysis Catheters Placed with Venous Ultrasound?

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Abstract

Introduction and Objectives: Due to their flexibility, their diameter and the barrier antimicrobial in connection with a subcutaneous tunnelling, catheters (KTT) tunnelled are increasingly used hey medialise. The object of our work is to determine the complications of tunnelled catheters placed with a simple echolocation of the central venous passage.

Materials and Methods: We carried out a prospective study spread over one year in the nephrology department of the CHU Hassan II in Fez. The KT T tunnels under echo guidance pour setting in haemodialysis without prior arteriovenous fistula (AVF), and in chronic haemodialysis patients after thrombosis of AVF.

Results: We posed 35 KTT tunnels in 33 patients. The indication for the installation of tunnelled KTT was definitive in 3 chronic haemodialysis patients (9.1%). The insertion site was right jugular for 32 tunnelled KTT (91.4%) and right femoral for the other three. Complications during insertion were uncomplicated arterial puncture in 4 cases (11.4%); a bend in 2 cases (5.7%); a deviation of the KT T in the subclavian vein in an obese patient and a sheet bleeding at the level of the tunnelling opening in two cases. We recorded a thrombosis of the arterial lumen after 2 months of use, one case of externalization of the subcutaneous segment after 14 months of use and two infections (5.71%) of the tunnel opening.

Conclusion: The low incidence of thrombotic and infectious complications, but also of immediate complications, argues for a recommendation to place tunnelled catheters in haemodialysis despite the absence of a fluoroscopy.

Keywords: Complications; Tunnelled; Haemodialysis; Catheters

Introduction

The efficacy and quality of results obtained in chronic haemodialysis are based on good, reliable and long- lasting vascular access [1,2]. The catheter's (KTT) tunnelled of haemodialysis are an alternative to the FAV or a solution when troubleshooting malfunctions thereof [1,2]. Also, due to the silent evolutionary nature of renal disease, the incidental discovery of end-stage nephropathies is frequent [3]. A preparation of AVF can be made at this time

but its use requires a time of maturation; and the first made AVF may or may not provide good throughput for haemodialysis. Tunnelled KTTs are therefore the ideal solution while waiting for the maturation of a first AVF. All this thanks to their long lifespan and the subcutaneous tunnelling which constitutes a real infectious barrier [4]. This tunnelling and jugular venous puncture have led to the use of fluoroscopy [2]. However, this imaging method is not easily accessible in the countries development compared to ultrasound. Given the advantages granted by this type of KTT, should the presence of a fluoroscopy condition their implementation? It is on these facts that lies the interest of our work with as objectives to determine the complications and the lifespan of the tunnelled KTTs placed without fluoroscopy.

Patients and Methods

Our study was prospective and s' is spread throughout the year 2015, it has been held in the service of Nephrology CHU Hassan II of Fez in Morocco.

The placement of the tunnelled catheters took place in the gesture room (Figure 1).

Figure 1: Gesture room, nephrology department, CHU Hassan II of Fez.

Tunnelled KT T were placed in patients with newly discovered end- stage renal failure (ESRD) and in chronic haemodialysis patients who had thrombosed their AVF, while awaiting the preparation of another. We excluded patients with active, uncontrolled infection and / or blood crass disorder.

The type of KTT

We have used catheters bilumières Hemosplit (Figure 2). They are flexible silicone polysulfide catheters with cuff, 14.5 F in diameter, available in several lengths depending on the insertion site and the size of the patient. The sizes available were 19 cm and 23 cm from the Cuff; for the jugular site, the choice was made according to the size of the patient by measuring the distance between the union of the upper 2/3 and the lower 1/3 of the sternal manubrium and the puncture point. For patients where this distance was less than or equal to 10 cm, we opted for the KTT of 19 cm and for those greater than 10cm, we opted for the KTT of 23 cm [5,6].

Figure 2: The catheter tunnelled haemodialysis Hemosplit.

The placement of the catheter

It was made by two doctors Nephrologists accompanied a (an) caregiver (s). The asepsis was surgical. The patient was scoped with a voltage taken it all the 30 minutes s. The venepuncture was made by ultrasound guided by the Seldinger technique [1]; the internal jugular vein was punctured posteriorly with a puncture point 1 cm above the clavicle. The femoral approach was used only as a last resort in patients with a contraindication to placement of a jugular catheter. The subcutaneous tunnelling was done 10 cm below the clavicle for an internal jugular approach and 8 cm below the puncture point for the femoral approach. A standard x-ray condition made systematically after each installation (thoracic for jugular KTT and pelvis for femoral KTT).

Catheter ablation

It was done by a doctor accompanied by a caregiver. It was indicated in the patients from the availability of a FAV functional ready to use, and also in case of malfunction mechanical or severe infectious complications. After ablation, the ends of the catheter were systematically sent for bacteriology for culture.

In each patient we collected: age, sex, underlying nephropathy, duration of catheterization, complications that occurred.

The data collected was analysed with Excel 2007 and Epi Info 7 software.

Results

Patient profile

Tunnelled KTs were applied in 33 patients with a mean age of 49.9 +/- 16.7 years with a sex ratio of 0.63 M/F; the causal nephropathies of end-stage chronic renal failure are shown in table 1. Thirty- five tunnelled KTs were performed; two patients in fact benefited from two tunnelled KTs each.

Causal nephropathy	Not
Indeterminate	14 (42.2%)
Diabetes	7 (21.2%)
HTA	5 (15.1%)
Polycystic kidney disease	2 (6.1%)
Cortical necrosis	2 (6.1%)
Vasculitis	2 (6.1%)
Lithiasis nephropathy	1 (3.0%)
Total	33 (100%)

Table 1: Etiologies of end-stage chronic renal failure. Hypertension: Hypertension Blood.

Complications

During catheter placement we did not record any case of hemithorax, pneumothorax, or venous rupture. A non-arterial puncture complicated is occurred in 4 cases (11.4%). Sheet bleeding from the entrance to the tunnel was found in two cases (5.7%), which stamped out after continuous long compression (over an hour) with a sandbag.

Chest X-rays after laying allowed to identify three cases (8.6%) of kinking of KTT and 1 case KT deflection tunnelled jugular domestic law in the subclavian vein, this in an obese patient (Figure 4).

Among the complications occurring in the medium and long term, we recorded a thrombosis of the arterial lumen after two months of use (2.8%), a case of externalization of the subcutaneous segment at the end of 14 months of use (Figure 3) and two infections (5.7%) of the tunnel opening.

Figure 3: Complications of tunnelled KT: exteriorisation of a sub-catenated segment after 14 months of use.

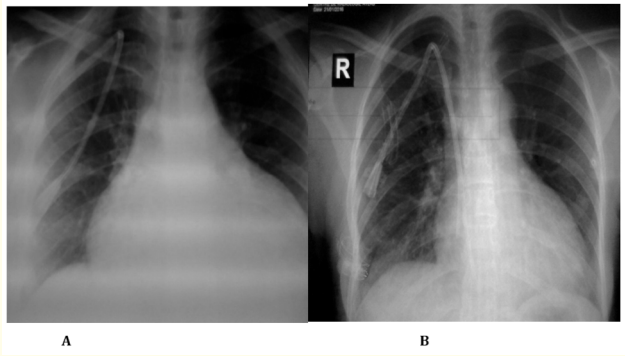

Figure 4: Complications of fitting the tunnelled KTs: A Couture; B: Deviation in the subclavian vein.

Duration of use and removal of tunnel catheters

Of the 35 tunnelled KTTs installed, 21 were still in place at the end of the study with an average duration of use of 213.1 ± 106 days. Survival after one month is 65.8% (Figure 3).

Of the 14 tunnelled KTTs removed, the indication for catheter ablation was AVF maturation in 13 catheters (92.8%); a single tunnelled KTT was removed for infection of the cutaneous orifice of tunnelling complicated by severe sepsis due to staphylococcus aureus, controlled with the combination of Gentamycin and Amoxicillin combined with clavulanic acid. No catheter was removed for thrombosis.

Figure 5: Survival of tunnelled catheters maintained over time.

Discussion

Patient profile and interest of tunnel catheters

Despite the recommendations and scientific advances in terms of diagnostic and therapeutic management, the incidence of nephropathies discovered in the terminal stage remains high [4]. Our study population reports 35 tunnelled KT T posed in 33 patients, of which nearly half of these patients (42.2%) have an IRCT of undetermined cause. The 2 main determined causes of nephropathy are diabetes and hypertension; and 21% of patients are over 65 years old. All this explains the precariousness of vascular access in haemodialysis patients, and the sudden dialysis thus leading to a high use of venous access. Graham J., *et al*. In Canada [7] reported a high prevalence of the use of venous access of around 40% in chronic haemodialysis patients, this because of the precariousness of vascular access. Data from 2005 in the United States (USRDS) show that the use of KTT remains at a high level [8]. The patients are so many to find without dialysis fistula arteriovenous -veinous beforehand. Apart from temporary KTTs, which are quick and easier to install, they have a short period of use compared to the time required for the preparation and maturation of an AVF. In fact, the KDOQI 2000 recommendations [5] limit the duration of use of a temporary femoral haemodialysis KT to 7 days and a temporary jugular KTT to 21 days, in particular because of their high risk of infection. KTT tunnelled which by their subcutaneous tunnelling reduce this risk would be an alternating ideal recreational activity for FAV [1,5,6].

Place of ultrasound guidance and fluoroscopy

The fitting of our tunnelled KTs made under ultrasound guidance took place in the gesture room of our service which is located near the dialysis room, thus entering the framework of interventional nephrology. Sampathkumar K., *et al*. in India [10] sharing the experience of a haemodialysis center posed 100 tunnelled KT; each placement was performed by a nephrologist under ultrasound guidance either in the interventional unit or in radiology under fluoroscopy in patients with vascular access considered difficult. Ultrasound guidance decreases the risk of complications, indeed the literature reports the presence of jugular anatomical variations in 5 to 18% of patients [11]. And in the context of jugular punctures, a significant reduction in arterial punctures under ultrasound guidance or echo - tracking has been demonstrated [12]. Our study reports a low incidence of arterial puncture, and the absence of pneumothorax, haemothorax or venous rupture. Sampathkumar K., *et al*. [10] also found none of these complications in their study. The virtual absence of complications during ultrasound-guided venepunctures in our study reaffirms the gain brought about by echospotting in the central venous accesses.

However, we recorded a case of deviation of the path of the catheter in the subclavian vein in an obese patient when the puncture was right internal jugular. This raises the question of the need for fluoroscopy. Sampathkumar K., *et al*. [10] in their series only had recourse to fluoroscopy in 8% of cases, particularly in patients whom they judged to have difficult vascular access and at high cardiovascular risk. Stratton J., *et al*. [13] in the United Kingdom compared 2 series: one of 358 KT T tunnels inserted in an operating room by a surgeon using fluoroscopy and another of 454 KTT tunnels placed by a nephrologist in an operating room. interventional nephrology without fluoroscopy with patient monitoring; their results revealed no significant difference in terms of survival of tunnelled KTT and complications at the time of insertion between the two series. The presence of a fluoroscopy is certainly ideal, but its absence should not prevent the installation of tunnelled KTT in a nephrology department.

Apart from the complications occurring during the break, which are almost absent in our study as we said above, two cases (6.1%) of bleeding from the entrance opening of the tunnel were found. Our results confirm those of Sampathkumar and al who have found that bleeding in 8 cases out of 100, having fallen after a prolonged compression as in our work. By the way, given the subcutaneous tunnelling, the risk of haemorrhage is even higher compared to temporary KT, this justifies a longer monitoring of the patient after the pregnancy. Thus Canaud B., *et al*. [1,5,6] advise for the installa-

tion of tunnelled KTT a hospitalization of 24 hours with a preparation of the patient in the morning, the gesture in midday followed by a surveillance of 6 hours then an evening outing in the absence of complications.

The incidences of thrombosis and infectious complications are low in our study where the catheters were locked exclusively with standard heparin. L a subcutaneous tunnelling is therefore a real infectious barrier. Studies in chronic haemodialysis patients comparing the rate of infection linked to the use of tunnelled and non-tunnelled catheters have shown the value of tunnelling as soon as the period is prolonged [14-16]. Also due to their diameter and flexibility, tunnelled KTs have less risk of occlusion compared to provisional KTs. Sampathkumar K., *et al*. [10] found occlusion of catheters in only 2% of cases; our study therefore matches the data in the literature with an occlusion incidence of around 3.03%.

The use of tunnelled KTT involves great aseptic precautions but also know-how not only for health workers but also for the patients concerned who should be educated in terms of asepsis and the risk of manipulation of the catheter. Thus we found in our study a case of exteriorization of the cutaneous segment of the KTT, after 14 months of use. This can be explained by improper handling during dialysis sessions. In fact, in Italy, a haemodialysis center reporting a 10- year experience on 450 KTT tunnels recorded 22 cases of externalization of KTT tunnels after one year of use, this in relation to manipulations of KTT by patients [17].

Duration of catheterization

As the risks of infection and thrombosis are lower, the tunnelled KTT thus end up with a longer duration of use than the temporary KTT. In Turkey Sarikaya A., *et al*. found retrospectively on a series of 297 tunnelled KTT an average duration 224.9 + 162.9 days [17], approximating the average duration found in our series (213.07 +/- 106.77 days). Also Sampathkumar K., *et al*. [10] found after six months a survival of KTT of 55%; in our series of 35 KTT tunnels, it is 65.8%. We did not find any consensus in the literature as to the maximum duration for which the ablation of a tunnelled KTT is recommended. However, it should be noted that Sarikaya., *et al*. [18], Canaud B., *et al*. [1,5,6] report in their review of the literature cases of KTT tunnelled in place for more than three years in chronic haemodialysis patients. elderly without any possibility of making FAV. Thus some authors recommend keeping the tunnelled KT in place as long as it is necessary and as long as there are no complications [1,5,6,14].

Conclusion

Complications during the installation and those in the medium term of a tunnelled KTT placed with a simple ultrasound identification of the central venous route, are rare in our study. The absence of fluoroscopy does not increase the risk of complications during the procedure. should not be an obstacle to the placement of tunnelled KTTs, but rather be recommended in patients, especially those who are overweight.

Conflict of Interest

The authors do not report any conflict of interest.

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