ANNEXES TO CHAPTER 6

Clinical Question XXV. Are there differences in the indication to use non-tunnelled catheters versus tunnelled catheters?

A significant number of patients require temporary vascular access because of acute renal failure, slow maturation or failure of their permanent arteriovenous access or as a bridge until transplant or peritoneal dialysis. In such situations, non-tunnelled temporary catheters tend to be used when the catheter is needed for only a short period of time and tunnelled catheters for longer periods.

Because the majority of infections carried by the blood are caused by colonisation of the catheter by the skin's flora, subcutaneous tunnelling is performed with the aim of increasing the distance between the point of insertion of the catheter into the vessel and the exit site on the skin (Vats 2012).

Non-tunnelled temporary catheters can be inserted relatively easily under local anaesthetic, while insertion of a tunnelled catheter is a longer surgical procedure and requires more experience and skill on the part of the doctor. In addition, subsequent removal is hampered by growth of subcutaneous tissue in the cuff. These drawbacks may explain why non-tunnelled temporary catheters are more widely used (Weijmer, 2004). However, this is despite the fact that numerous observational studies have shown an increased risk of bacteraemia and unplanned early removal with non-tunnelled catheters.

We found no randomised studies directly comparing the results of the two types of catheter. We were only able to find some comparisons of clinical series; studies for which there can be a high risk of selection bias.

As will become clear in the following sections, some authors and organisations propose using the anticipated time on haemodialysis as main decision-making criterion for the use of temporary catheters and recommend their use for short periods of time, e.g. two or three weeks at most.

The observational study by Weijmer (2004) examined the outcomes of 272 catheters (149 patients, 11,612 catheter-days, 37 tunnelled and 235 non-tunnelled). Patients with non-tunnelled catheters were more often diagnosed with acute renal failure (40% compared to 8% of the tunnelled, p<0.001), had higher hospitalisation rates (54% vs 14%, p<0.001) and used fewer coumarins (11% vs 27%, p<0.01). Early removal of the catheter: Rates were 1.80 per 1000 catheter-days for the tunnelled and 19.48 for the non-tunnelled temporary catheters (RR 10.83, 95% CI: 5.82 to 20.15; p<0.0000001); 45.5% (107/235) of the temporary catheters removed compared to 28.7% (11/37) of the tunnelled (p<0.001, log-rank test). After adjustment for different patient characteristics, the most important risk factor for early catheter removal (RR 9.69, p<0.001) and for infection (RR 3.76, p<0.001) was having a non-tunnelled catheter. Catheter survival, analysed by means of survival curves, was better for tunnelled catheters (95% at 14 days, 95% at 21 days and 95% at 28 days) than for non-tunnelled temporary femoral catheters (42% at 14 days, 37% at 21 days and 32% at 28 days, p<0.001 for all periods) and non-tunnelled temporary jugular catheters (75% at 14 days, 69% at 21 days and 58% at 28 days, p<0.05 for all periods).	**Low quality**

<u>Catheter survival free of infection</u> was best for tunnelled catheters from two weeks after catheter placement (p<0.05 vs each of the temporary catheter subgroups).

<u>Bacteraemia.</u> Rates per 1000 catheter-days: 1.6 for tunnelled catheters and 4.6 for temporary catheters (RR 2.67, 95% CI: 1.28 to 5.59; p=0.006).

<u>Infections at the catheter exit site.</u> Rates per 1000 catheter-days: 1.3 for tunnelled catheters and 8.2 for temporary catheters (RR 6.26, 95% CI: 3.04 to 14.22; p<0.000001).

They conclude that, according to these results, a tunnelled catheter should be used whenever it can be foreseen that a haemodialysis catheter is needed for more than 14 days.

Frankel (2006) states that although vascular access for haemodialysis is generally geared towards the provision of a long-term native arteriovenous fistula, there are a number of situations in which urgent access to the circulation is required and this is usually achieved by the use of dialysis catheters. Such catheters are unavoidable for:

Low quality

(1) Patients with reversible deterioration of renal function who need temporary dialysis.

(2) Patients whose end-stage renal failure has not been diagnosed previously, and who require dialysis as an emergency, or while awaiting creation or maturation of a permanent vascular access.

(3) As a bridging modality when a patient's access has failed, whether permanent vascular access or peritoneal dialysis.

Frankel considered that tunnelled catheters had a significantly lower rate of infection than the non-tunnelled temporary catheters (8.42 vs 11.98 cases per 100 catheter-months respectively) and should be the preferred option for providing temporary vascular access for periods for more than 2 weeks.

The study by Kukavica (2009) compared 16 patients treated with permanent catheter and 15 treated with temporary catheters, followed up for 36 months, and found that there were 24 catheter replacements in patients with temporary catheters compared to only 2 in patients with permanent catheters.

Low quality

Mean flow rate in patients with permanent catheter was significantly higher (296 ml/min) than that in patients with the temporary catheter (226 ml/min) (p<0.001).

Summary of evidence

Observational studies show that compared to permanent tunnelled catheters, the use of temporary catheters is associated with higher rates of infection and catheter removal. Experts recommend limiting use of permanent catheters to a maximum of two or three weeks.

Low quality

Patients' values and preferences *No relevant studies related to this aspect have been identified.*	

Use of resources and costs *No relevant studies related to this aspect have been identified.*	

Recommendations [Proposal derived from analysis of the literature]

Weak	The use of temporary catheters should be limited to situations where short-term use is foreseen, not exceeding two or three weeks.

References

Frankel A. Temporary access and central venous catheters. Eur J Vasc Endovasc Surg. 2006 Apr; 31(4):417-22.

Kukavica N, Resic H, Sahovic V. Comparison of complications and dialysis adequacy between temporary and permanent tunnelled catheter for haemodialysis. Bosn J Basic Med Sci. 2009 Nov; 9(4):265-70.

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Quori A, Baamonde-Laborda E, García-Cantón C, Lago-Alonso MM, Toledo-González A, Monzón-Jiménez E, Jiménez-Díaz D, Checa-de-Andrés M, Molina-Cabrillana J. Surveillance for infections and other adverse events in dialysis patients in southern Gran Canaria. Nefrologia. 2011; 31(4):457-63.

Vats HS. Complications of catheters: tunneled and non tunneled. Adv Chronic Kidney Dis. 2012 May; 19(3):188-94.

Weijmer MC, Vervloet MG, ter Wee PM. Compared to tunnelled cuffed haemodialysis catheters, temporary untunnelled catheters are associated with more complications already within 2 weeks of use. Nephrol Dial Transplant. 2004 Mar; 19(3):670-7.

Table 1. STUDIES EXCLUDED

Study	Cause for exclusion
Oliver 2002	Compares two specific types of temporary catheter, it does not compare tunnelled catheters and non-tunnelled catheters.
Quori 2011	Study on incidence of infections and adverse effects which has no detailed information enabling comparison of outcomes with permanent tunnelled catheters (used in 35.5% of patients) and temporary non-tunnelled catheters (used in 1% patients).

GRADE TABLES

Date: 2014-01-22
Question: Should temporary vs tunnelled catheters be used in haemodialysis?
Bibliography: Weijmer MC, Vervloet MG, ter Wee PM. Compared to tunnelled cuffed haemodialysis catheters, temporary untunnelled catheters are associated with more complications already within 2 weeks of use. Nephrol Dial Transplant. 2004 Mar; 19(3):670-7.

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Temporary catheter	Tunnelled catheter	Relative (95% CI)	Absolute		
Early removal of catheters due to complications												
1	observational studies	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	107/5494 (1.9%)	11/6118 (0.18%)	RR 10.83 (5.82 to 20.15)	18 more per 1000 (from 9 more to 34 more)		CRITICAL
Bacteraemia												
1	observational studies	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	25/5494 (0.46%)	10/6118 (0.16%)	RR 2.67 (1.28 to 5.59)	3 more per 1000 (from 0 more to 8 more)		CRITICAL
Infections on the catheter exit site												
1	observational studies	serious[1]	no serious inconsistency	no serious indirectness	serious[2]	none	45/5494 (0.82%)	8/6118 (0.13%)	RR 6.26 (3.04 to 14.22)	7 more per 1000 (from 3 more to 17 more)		CRITICAL

[1] Observational study. High risk of patient screening bias.

[2] Wide confidence interval.