Patency of Vascular Accesses for Thai Hemodialysis Patients

Narongchai Wongkonkitsin MD*,
Supatcha Prasertcharoensuk MD*

** General Surgery 4 Unit, Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand*

Objective: *Vascular access for hemodialysis is the mode of renal replacement therapy for chronic renal failure patients. The present study reports patency rates of arteriovenous fistula (AVF) and graft (AVG).*
Material and Method: *Between July 2008 and June 2011, 336 vascular accesses were performed in 293 patients in Department of Surgery, Faculty of Medicine, Khon Kaen University. The patient was follow until June 2012. A retrospective review was conduct to analyze patency rate.*
Results: *Two hundred ninety three patients underwent 286 AVFs and 50 AVGs. Patency rate was analyzed with the Kaplan-Meier method. Primary patency rate of AVF at one, two, and three-year was 78.69%, 70.43%, and 60.72%, respectively. Assisted primary patency of AVF at one, two, and three-year was 88.24%, 75.63%, and 40.34%, respectively. Secondary patency rate of AVF at one and two-year was 71.46% and 71.46%, respectively. Primary patency rate of AVG at one, two, and three-year was 63.94%, 43.93%, and 36.60%, respectively. Assisted primary patency of AVG at one-year was 100%. Secondary patency rate of AVG at one-year was 46.30%. Graft infection was the major complication of AVG (12%).*
Conclusion: *The authors' results of vascular access surgery were comparable to results from a review of literature.*

Keywords: *Chronic renal failure, Hemodialysis, Vascular access, Arteriovenous fistula, AVF, Arteriovenous graft, AVG, Patency*

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Vascular access is a choice for end stage renal disease (ESRD) patient to receive chronic hemodialysis[1]. The National Kidney Foundation (NKF) issued the Kidney Disease Outcomes Quality Initiative (KDOQI) CPGs for Vascular Access in an effort to improve patient survival and quality of life (QOL), reduce morbidity, and increase efficiency of care. KDOQI advocated Fistula First Program and set the target for fistula creation as 65% by 2009[2]. Published studies demonstrated that fistula present superior overall patency and lower revision rates compared to prosthesis grafts. However, they had rate variation in reported outcomes. The authors reviewed our clinical experience with vascular accesses as arteriovenous fistula (AVF) and arteriovenous graft (AVG) to determine the outcome of these vascular accesses.

Material and Method

Between July 2008 and June 2011, 336 vascular accesses were performed in 293 patients in our unit. The patients were follow until June 2012. Follow-up evaluation was obtained by chart review, letter, and telephone contact. The authors' study was performed after Institutional Review Board approval.

The procedures were performed by a vascular surgeon and general surgeons in our unit. The choices of vascular access were forearm AVF, arm AVF, forearm AVG, and arm AVG, depending on visible superficial vein. The authors had done transposed brachial-basilic AVF (TBBAVF) for some patients who lacked superficial vein after discussion about TBBAVF versus AVG. Pre-operative vein mapping with duplex ultrasound was performed in patients who lacked visible superficial vein.

Data was collected from chart retrospectively. Primary outcomes were primary, assisted primary, and secondary patency. Primary patency is the interval from the time of access placement until any intervention designed to maintain or reestablish patency, access thrombosis, or the time of measurement of patency[3]. Assisted primary patency is the interval from the time of access placement until access thrombosis or the time of measurement of patency, including intervening manipulations designed to maintain the functionality of a patent access[3]. Secondary patency is the interval from the time of access placement until access abandonment, thrombosis, or the time of patency

Correspondence to:
Wongkonkitsin N, General Surgery 4 Unit, Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.
Phone & Fax: 043-348-393
E-mail: narwon@kku.ac.th

measurement including intervening manipulations designed to reestablish functionality in thrombosed access[3]. Patency rates were calculated using Kaplan-Meier survival curve (Stata version 10). Patient deaths unrelated to access failure was considered lost to follow-up. Secondary outcomes were the rates of complications.

Results

Between 2008 and 2011, 293 patients underwent vascular access surgery. Patient demographics are listed in Table 1. Two hundred eighty six AVFs (85.12%) and 50 AVGs (14.88%) were created (Table 2). Thirty-three patients underwent more than one access with maximum of four accesses.

Patency rates of AVFs and AVGs shown in Fig. 1 and 2, and Table 3. Of 286 AVFs, three (1.05%) patients had complications (one (0.35%) had venous hypertension, one (0.35%) had lymphatic leakage, and one (0.35%) had infection causing active bleeding). Of 50 AVGs, 10 (20.00%) patients had complications (two (4.00%) had venous hypertension, two (4.00%) had steal syndrome, and six (12.00%) had infection (one had active bleeding)).

Discussion

The authors unit first performed vascular access surgery in mid-2008. The authors followed KDOQI guideline, promoted Fistula First Program, and created fistulae. Up to 85% follow it, which more than the target of Fistula First Program.

Table 1. Patients' characteristics data

Characteristic	Total (n = 293)
Male/female	162/131
Mean age ± SD (years)	57.29±13.82
Hypertension	160 (54.61%)
Diabetes	119 (40.61%)

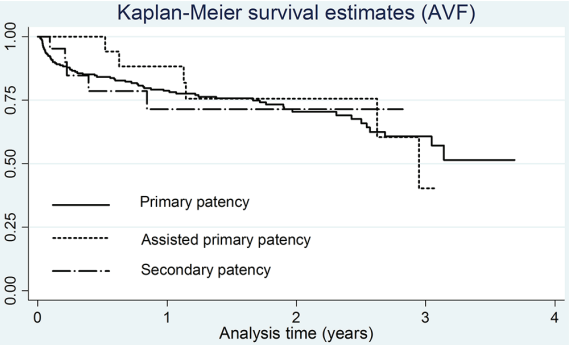

Fig. 1 Patency of arteriovenous fistula.

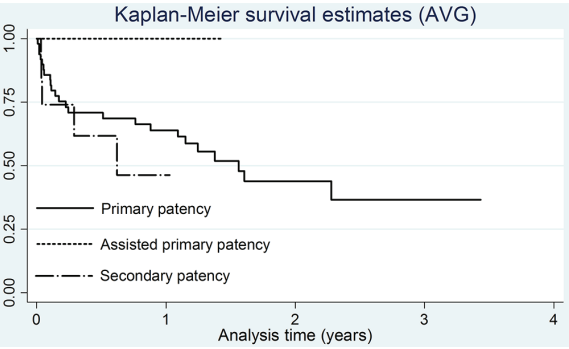

Fig. 2 Patency of arteriovenous graft.

The review of the literatures showed that AVFs had primary patency varied between 36% and 90%, 28% and 87.7%, and 39% and 80% at one[6,8-18], two[7,9,10,12,15,17,18], and three-year[4,8], respectively, and had secondary patency varied between 46% and 90% and 48% and 86% at one[6,9,12-18] and two-year[9,10,12,15,17,18], respectively. The present study had primary and secondary patency of AVFs closely similar to the review.

Previous reports showed AVGs had primary patency varied between 22% and 74% and 13% and 82.6% at one[5,6,8,10-18] and two-year[5,7,9,10,12,15,18], respectively, and had secondary patency varied

Table 2. Types of vascular accesses

Arteriovenous fistula	Total (n = 286)	Arteriovenous graft	Total (n = 50)
Forearm 179 radial-cephalic 9 snuff box 6 ulnar-basilic 3 radial-basilic 1 ulnar-cephalic	198 (69.23%)	Forearm 40 loop configuration 3 straight configuration	43 (86%)
Arm 77 brachial-cephalic 11 transposed brachial-basilic	88 (30.77%)	Arm 1 loop configuration 6 straight configuration	7 (14%)

Table 3. Patency rates of arteriovenous fistula (AVF) and arteriovenous graft (AVG)

Types/patency rates	1 year (%)	2 years (%)	3 years (%)
AVF, primary patency	78.69	70.43	60.72
AVF, assisted primary patency	88.24	75.63	40.34
AVF, secondary patency	71.46	71.46	-
AVG, primary patency	63.94	43.93	36.60
AVG, assisted primary patency	100.00	-	-
AVG, secondary patency	46.30	-	-

between 54% and 87% at one-year[6,9,12,13,15-18]. The present study had primary patency of AVGs closely similar to the review, but had secondary patency lower than the review. This poorer result might be caused by patients selected for AVGs surgery were the patients left from selection for AVFs or patient who had previous AVF failure.

The reported incidence of infection affecting AVFs ranged from 0.56% to 5% per year and AVGs ranged from 4% to 20% per year[19]. Incidence of arterial steal syndrome from a review of literature was 0.25% to 1.8% for AVFs and was 4% to 9% for AVGs[19]. The present study showed the complications were consistent with the reported incidence.

In conclusion, KDOQI guideline and Fistula First Program can be achieved. The present results of vascular access surgery were comparable to results from the review of literatures.

What is already known on this topic?

The review of the literatures showed that AVFs had primary patency varied between 36% and 90%, 28% and 87.7%, and 39% and 80% at one, two, and three-year, respectively, and had secondary patency varied between 46% and 90% and 48% and 86% at one and two-year, respectively. AVGs had primary patency varied between 22% and 74% and 13% and 82.6% at one and two-year, respectively, and had secondary patency varied between 54% and 87% at one-year.

What this study adds?

The target of KDOQI guideline and promoted Fistula First Program is 65%, and can be achieved. The present study had primary and secondary patency of AVFs and primary patency of AVGs closely similar to previous reports, but had secondary patency of AVGs lower than the review. The present study showed the complications were consistent with the reported incidence.

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Potential conflicts of interest

None.

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ระยะเวลาการเปิดโล่งของหลอดเลือดเพื่อการฟอกเลือดในผู้ป่วยโรคไตวายเรื้อรัง

ณรงชัย ว่องกลกิจศิลป์, สุภัชชา ประเสริฐเจริญสุข

วัตถุประสงค์: เพื่อศึกษาระยะเวลาการเปิดโล่ง (patency rate) ของหลอดเลือดเพื่อการฟอกเลือดในผู้ป่วยโรคไตวายเรื้อรังชนิด arteriovenous fistula (AVF) และ arteriovenous graft (AVG)

วัสดุและวิธีการ: ทำการศึกษาเชิงวิเคราะห์แบบเก็บข้อมูลย้อนหลังในผู้ป่วยโรคไตวายเรื้อรังที่เข้ารับการผ่าตัดทำหลอดเลือดเพื่อการฟอกเลือด ระหว่างวันที่ 1 กรกฎาคม พ.ศ. 2551 ถึง วันที่ 30 มิถุนายน พ.ศ. 2554 โดยศัลยแพทย์ประจำหน่วยศัลยศาสตร์ทั่วไป 4 ภาควิชาศัลยศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น และเฝ้าติดตามผู้ป่วยไปจนถึงวันที่ 30 มิถุนายน พ.ศ. 2555

สถิติ: ใช้การวิเคราะห์ระยะปลอดเหตุการณ์โดย Kaplan-Meier method

ผลการศึกษา: ผู้ป่วย 293 ราย (286 AVFs and 50 AVGs) ได้รับการผ่าตัดทำหลอดเลือดเพื่อการฟอกเลือด พบว่า มีระยะเวลาการเปิดโล่งแบบปฐมภูมิ (primary patency rate) ของ AVF ที่ 1, 2 และ 3 ปี เท่ากับ 78.69%, 70.43% และ 60.72% ตามลำดับ ระยะเวลาการเปิดโล่งแบบปฐมภูมิที่ต้องมีการช่วยเหลือ (assisted primary patency) ของ AVF ที่ 1, 2 และ 3 ปี เท่ากับ 88.24%, 75.63% และ 40.34% ตามลำดับ ระยะเวลาการเปิดโล่งแบบทุติยภูมิ (secondary patency rate) ของ AVF ที่ 1 และ 2 ปี เท่ากับ 71.46% และ 71.46% ตามลำดับ

Primary patency rate ของ AVG ที่ 1, 2 และ 3 ปี เท่ากับ 63.94%, 43.93% และ 36.60%, ตามลำดับ assisted primary patency ของ AVG ที่ 1 ปี เท่ากับ 100% และ secondary patency rate ของ AVG ที่ 1 ปี เท่ากับ 46.30% และพบว่า ภาวะแทรกซ้อนส่วนใหญ่คือ การติดเชื้อของหลอดเลือดเทียม (12%)

สรุป: ผลการผ่าตัดหลอดเลือดเพื่อการฟอกเลือดในผู้ป่วยโรคไตวายใกล้เคียงกับการศึกษาก่อนหน้านี้