

Arteriovenous Fistula In End Stage Renal Disease With Modified Technique

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الخلاصة

الربط الشرياني الوريدي في الذراع هو الاختيار الاول للمرضى اللذين يعانون من عجز الكلى المزمن واللذين يحتاجون لغسل دموي مزمن وفي هذه الدراسة استخدمنا بعض الطرق المبتكرة لزيادة نسبة نجاح الربط (الناصور) حيث تم تقسيم المرضى الى مجموعتين الاولى (75 مريض) تم الربط حسب الطريقة المعتادة (داكر) والمجموعة الثانية (225 مريض) تم الربط لهم حسب مايلي (قطع جزء من جدار الشريان واحداث فتحة على شكل دائرة، عقد جميع فروع الوريد المستخدم للربط، توسيع الوريد باتجاه القلب باستخدام موسع الشرايين، الحفاظ على الذراع ممدودة لمدة ثلاثة ايام، الحفاظ على معدل ضغط الدم فوق 100 مل لثلاثة ايام بعد الربط، اعطاء المريض علاج الهيبارين لثلاثة ايام بعد الربط) وكانت نسبة نجاح الربط في المجموعة الثانية (92,5%) اكبر بصورة واضحة من المجموعة الاولى (84%) لذلك ننصح باتباع الطريقة المبتكرة للربط لمرضى العجز الكلوي المزمن .

Abstract

Background brachiocephalic fistula is a best choice for long term hemodialysis as a vascular access comparing with central venous catheter & arterio venous graft .

Aim: aim of this study is to increase successful rate of brachiocephalic fistula.

Methods: In this study patients divided as controlled group (75 patients) which operated on with classical technique & studded group (225 patients) which operated on with modified technique I e (cut a patch from arterial wall, ligation of distal & deep tributaries , us of heparin , avoid hypotension & keep upper limb extended & supinated.

Results: Overall successful e rate was 90,4% which represent as 84% in controlled group & 92,5% in studded group .

Although DM represent 61% of patients & hypertension represent 56,5% of patients the failure rate was more in patients with HT (72%) & (55,1) in patients with DM.

Conclusion: Modified technique for arteriovenous fistula should be used in all patients with DM, HT & CTD to increase successful rate .

Introduction

patient with end stage renal disease need hemodialysis which it is provided through a central venous catheter (cvc), arteriovenous graft (avg), or arteriovenous fistula (avf).

The BCF is a suitable first choice for access (1,2,3,4). the cephalic vein in the upper arm is larger with increased flow as compared to the lower arm.

The second choice is the lower arm radiocephalic (RCF); however this access often fails to mature in the elderly patient with underlying vascular disease, particularly in diabetics (4,5,6). So brachiocephalic fistula

(BCF) is being placed with increased frequency because of the high failure rate of (RCF).

The anastomosis for a BCF is usually in the antecubital fossa between the brachial artery & cephalic vein. the location of the BCF enables ease of cannulation with the benefit of a large surface area.

The BCF is the best access option for the older diabetic patient on hemodialysis.

Even though complication of fistula access are far less than a graft or a catheter, they do occur & need to be addressed .

These complication have historically been classified as early & late failure.

Early complications

Early failure of an AVF is defined as a fistula which never matures or is unable to be used by three months of time. It is well known from several studies that there is a significant primary failure rate for all AVF that are placed^(1,2,7,8). Causes of early fistula failure are due to inflow problems from inadequate arterial supply, anastomotic stenosis which result from trauma during creation, or outflow problems of the venous segment. Outflow problems may occur because of underlying fibrosis of the vein. Other factors which contribute to the primary failure of fistulas include demographic factors such as age, obesity, non-white ethnic group, female sex, history of diabetes or peripheral vascular disease^(8,9,10). The size of underlying vein may also influence the ability of a fistula to mature. A cephalic vein diameter of less than 2mm on ultrasound in the forearm & less venous distensibility increases the risk of primary failure^(11,12,13).

A cause of poor maturation is the development of collateral circulation. Often times a fistula is placed & when developing, collateral vessels may form which decrease flow. From May 2004 to January 2014, three hundreds patients with end stage renal disease attended to Al Dewanya teaching & private hospitals for brachiocephalic fistula.

We excluded patients with unpalpable cephalic vein from this work.

Our Data was collected during the 6 weeks post fistula creation focusing on early complication.

was done by a cut piece of arterial wall creating an oval or cephalic stoma, ligation of all deep & distal venous branches, proximal dilatation of cephalic vein to ensure continuity with deep venous system, irrigation the wound with 10% povidone iodine, closed the skin over corrugated drain, keeping operated limb pronated & supinated for 3 days, using anticoagulant (enoxaparin 100 iu per kg) for

the amount of flow through the designated vein to be used for cannulation. The physical exam may often help diagnosis this problem as you may palpate extra accessory vessels with an apparent augmentation in the vein when it is occluded. Small accessory vessels less than one-fourth the diameter of the main AVF are likely to be insignificant.

prevention of early fistula thrombosis with pharmacologic intervention has been the subject of several recent trials, which have shown only minimal effect. The dialysis outcome –practice patterns study (DOPPS) noted a lower risk of failure of established fistulas in patient who used ASPIRIN consistently over a year⁽⁴⁾. Dember study showed that Clopidrogrel reduced the risk of fistula thrombosis by 37%⁽³⁾. Many studies have shown a primary failure rate of 31%–61%^(1,3,7,15).

Late complications

Late failure of fistula is defined as occurring greater than three months after creation & is often due to outflow stenosis. Also complications includes aneurysms, steal syndrome, infection, cardiac failure, venous hypertension & median nerve injury.

Method

75 patients were operated on with classical technique (dagher), i.e. under local anesthesia, the cephalic vein & brachial artery were exposed through transverse incision, side to side or end to side anastomosis using 6/0 prolene suture then closed the skin by silk 2/0. 225 patients were operated on with additional modified techniques which includes, brachial arterectomy

3 days, avoiding hypotension by stopping or decreasing dose of antihypertensive drugs & avoiding hemodialysis by cvc for 3 days post operation if possible.

Results

Three hundreds brachiocephalic fistula were created in 190 females & 110 males patients. The main age of the patients was 58 years. The clinical characteristics of patients are represented in table 1.

Table 1. Clinical Characteristics of patients

	Controlled Group		Studied Group		Total No.	
No. of patient	75		225		300	
Gender						
Female	42	(56%)	148	(65,7%)	190	(63,3%)
Male	33	(44%)	77	(34,2%)	110	(36,6%)
Underlying Disease						
DM	39	(52%)	144	(64%)	183	(61%)
HTN	28	(37,3%)	138	(61,3%)	166	(55,3%)
CTD	3	(4%)	5	(2,2%)	8	(2,6%)
Complications	12	(16%)	17	(7,5%)	29	(9,6%)
Thrombosis	6	(8%)	11	(4,8%)	17	(5,6%)
Arm swelling	3	(4%)	5	(2,2%)	8	(2,6%)
Infections	1	(1,3%)	0		1	(0,3%)
Hematoma	2	(2,6%)	0		2	(0,6%)
Ischemia	0		1	(0,4%)	1	(0,3%)

Abbreviations: DM: diabetes mellitus; HTN: hypertension; CTD: connective tissue disease.

Patency rate was 89,4%(92,5% in studied group,84%in controlled group).the most common complication was thrombosis which developed in17 patients (4,8%in studied group & 8% in controlled group) ;most of those were treated with re-exploration & re-anastomosis.

Arm swelling developed in 8 patients (2,6%) due to outlet stenosis (2,2% in studied group &4% in controlled group)for which venous thrombectomy was performed for obstructed veins.

Additionally ,closure of fistula was performed in one patient with hand ischemia ,& 2 patients needed re-exploration for post operative bleeding.

Underling diseases were DM in 183 patients ,hypertension in 166patients & connective tissue diseases in 8 patients.

Five from 8 patients of CTD developed complications.

In our works 29 patients from 300 patient failed to mature early (6weeks post surgery) whom have underling disease as show in table 2.

Table 2. Underlying diseases in failure group (29 patients)

	Control Group(12)		Study Group(17)		Total No. (29)	
DM	4	(33,3%)	6	(35,2%)	11	(37,9%)
HTN	4	(33,3%)	10	(58,8%)	14	(48,2%)
CTD	2	(16,6%)	2	(11,7%)	4	(13,7%)

Abbreviations: DM: diabetes mellitus; HTN: hypertension; CTD: connective tissue disease.

DISCUSSION

This work is a comparative study between controlled group which follow classical technique in creation of brachiocephalic fistula & studied group which used a modified technique .

Over all successful rate in this study was 90,4% while in schild study 2004 & biukians study 2008 shows 61% & 73% respectively,this is may be because of

exclusion the patients with impalpable cephalic vein & used modified technique in our work.

Controlled group shows 84% successful rate while in studied group reach 92,5% .

With P value 0,047 &this is because of modified technique.

Diabetes was the major underlying disease in our patients(61%)while hypertension was the major underlying disease in failure group

(72,4%) which goes with many studies (Hasegawa, Dember, Leon & Rajan). Therefore control of blood pressure pre & post surgery may increase successful rate.

Patients with connective tissue diseases (8 patients) have highest failure rate (62,5%) & this is because of abnormality of arteries & veins endothelium which increase incidence of thrombosis. So patients with CTD should receive adequate medical care keeping them in remission state.

Many patients have more than one underlying disease which increases failure rate.

References

- 1-Biuckians A, Scott EC, Meier GH, Panneton JM, & Glckman MH. (2008). The natural history of autologous fistulas as first-time dialysis access in the K-DOQI era. *J Vasc surg*, Vol.47, No.2 (February, 2008), PP.415-421, PMID 18241764.
- 2-Dagher R, Gelber R, Ramos E & Sadler J. (1976) The use of basilica vein & brachial artery as an A-V fistula for long term hemodialysis. *J surg Res*, Vol.20, No.4, (April, 1976), PP.373-376, PMID933496.
- 3-Demer LM, Beck GL, Alton M, Delmez JA, Dixon BS, & Feldman HI, Dialysis Access Consortium Study Group (2008). Effect of clopidogrigrel on early failure of A-V fistulas for hemodialysis : a randomized controlled trail. *JAMA*, VOL.299, No.18, (May, 2008), pp.2164-2171, PMID18477783.
- 4-Hasegawa T, Elder SJ, Bragg-Gresham JI, Pisom RI & Fukuhama S (2008). Consistent aspirin use associated with improved A-V fistula survival among incident hemodialysis patients in the outcome & practice patterns study. *Clin J Am Soc Nephrol* VOL.3, No.5, (September, 2008) pp.1373-8, PMID18596119.
- 5-K-DOQI. (2006). Clinical practice guidelines for vascular access. *Am J Kidney Dis*, Vol.48, No.S1, (July, 2006) pp.S176-S247, PMID 16813991.
- 6-Leon C, Asif A. (2007) A-V access & hand pain : the distal hypoperfusion ischemic syndrome. *Clin J Am Soc Nephrol*, Vol.2, No.1, (January, 2007) pp.175-183, ISSN 17699402.
- 7-Schilid AF, Prieto J, Glenn M, Livingston J, Alfieri K, & Raines J. (2004). Maturation & fistula rate in a large series of a-v dialysis access fistulas. *Vas Endovasc Surg*, Vol.38, No.5, (October, 2004), pp.449-453. PMID3373618.
- 8-Taghizadah A, Dasgupta P, Khan MS, Taylor J, Koffman G. (2003) Long-term outcomes of

Conclusion & recommendation

1- patients with ESRD (end stage renal disease) should preserve both cephalic veins for AV fistula creation by avoiding puncture the veins for blood sampling or cannulation.

2- Use modified technique for creation of AV fistula in all patients.

3- Patients with CTD have a high risk of failure so those patients should be kept in remission state.

4- Any patient with AV fistula thrombosis should be re-explored & redone with modified technique.

brachobasilic transposition fistulas for haemodialysis. *J Vas Surg*, Vol.26, No.6, (December, 2003), PP.670-672, PMID 14603429.

9-Turmel-Rodrigues L, Penglon J & Redrigue H (2000), Treatment of failed native arteriovenous fistulae for hemodialysis by interventional radiology. *Kidney Int*, 57(3), (March, 2000) PP.1124-1140, PMID 10720965.

10-Verhallen AM, Kooistera MP, Jaarveld BC. (2007) Cannulating in hemodialysis : ropeladder or buttonhole technique? *Nephrol Dial Transplant*, Vol.22, No.9, (September, 2007) PP. 2601-2604, PMID 1755776

11-Vazquez MA. (2009) Vascular access For dialysis : recent lessons & new insights. *Current Opinions in Nephrology & Hypertension*, 18(2), (March, 2009), pp.116-121, PMID 19434049

12-Waltz P, Ladowski JS, Hines A. (2007) Distal Revascularization & interval ligation (DRIL) procedure for the treatment of ischemic steal syndrome after arm arteriovenous fistula. *Annals of Vasc Surgery* VOL.21, No.4, (July, 2007), pp. 468-473, PMID16419004

13-Wedgewood KR, Wiggins PA, Gullou PJ. (1984) A prospective study of end to side versus side to side arteriovenous fistulas for hemodialysis. *Br J Surg* Vol.71, No.8, (August, 1984) pp. 640-642, PMID 6743990

14-Walli MA, Eid RA, Dewan M, AL-Homrany MA. (2006) Pre-existing histopathological Changes in the cephalic vein of renal failure patients before arteriovenous fistula (AVF) construction. *Ann Thorac Cardiovas Surg* 2006, Vol.12, NO.5, (October, 2006), pp.341-348, PMID 17095976

15-US Renal Data System, USRDS (2009) Annual Data Report: Atlas of chronic kidney disease & end stage renal disease in the US. National Institute of health, National Institute of Diabetes & Digestive & Kidney Disease: Bethesda Maryland, <http://www.usrds.org>.