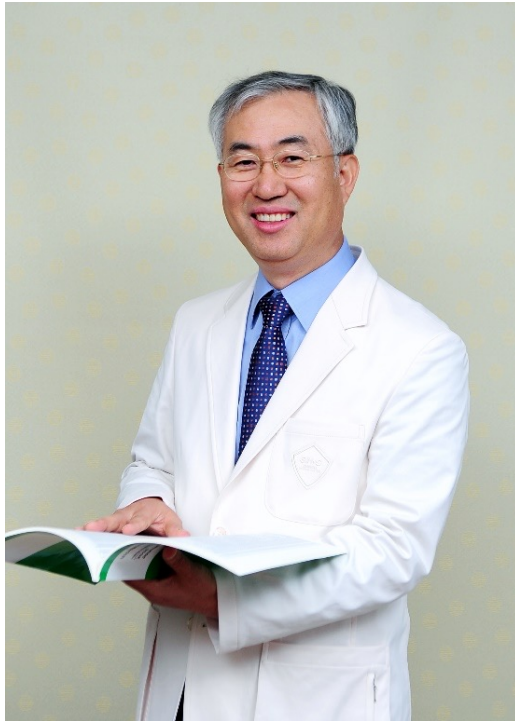




Effect of the renal function after left renal vein division during the abdominal aortic surgery



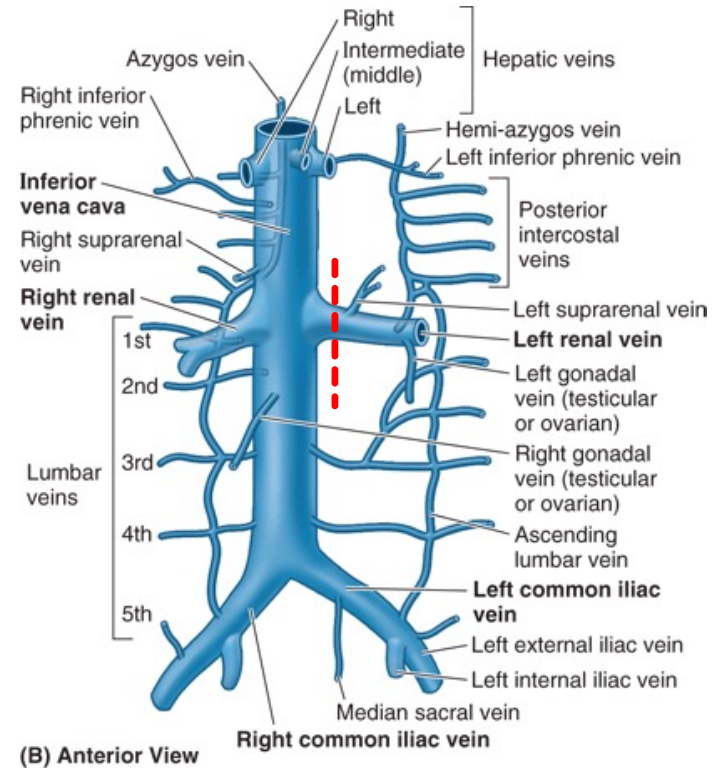
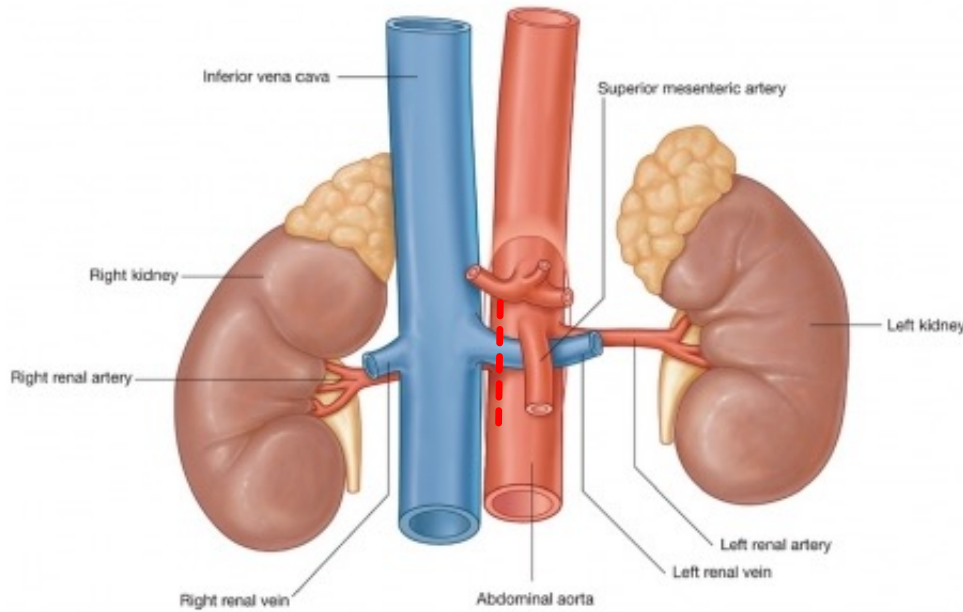
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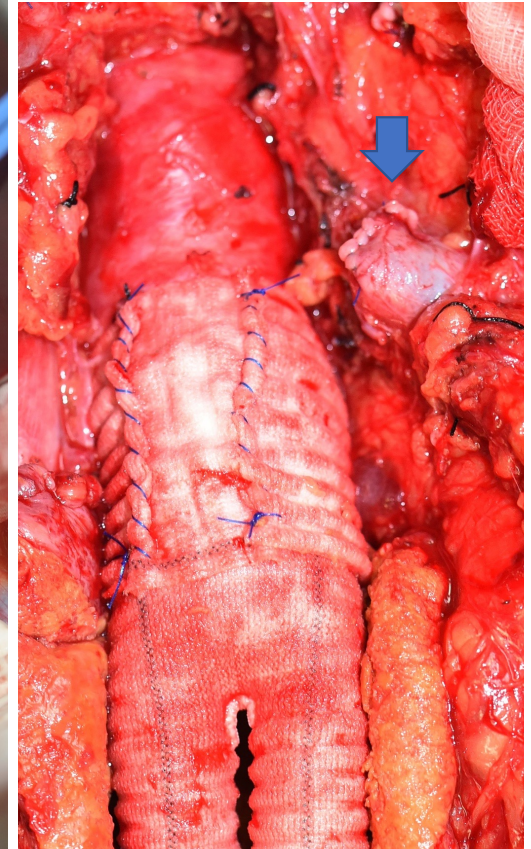
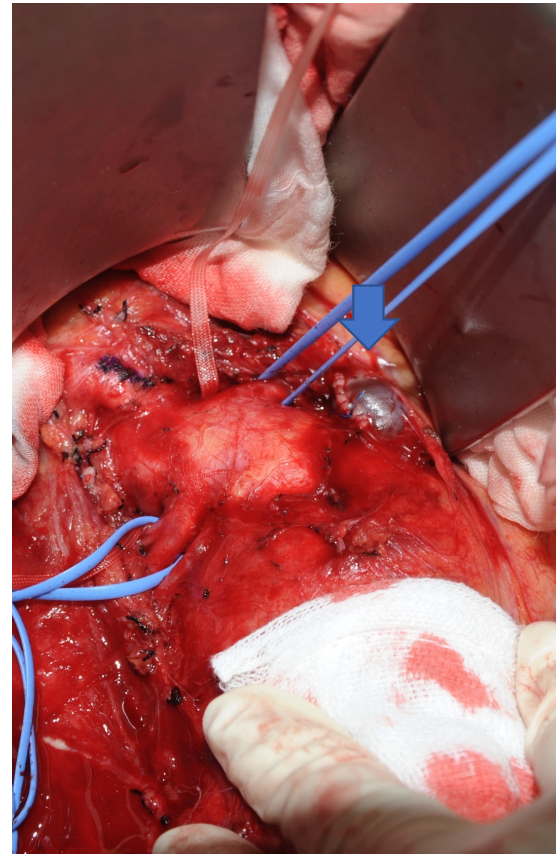
Left renal vein anatomy



(B) Anterior View

Left renal vein division

Lt Renal Vein Div



Introduction

Does Division of the Left Renal Vein During Aortic Surgery Adversely Affect Renal Function?

David Huber FRACS, John P. Harris MS, DDU, FRACS, FRCS, FACS, Philip J. Walker FRACS, James May MS, FRACS, FACS, Pauline Tyrer BSc

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Between July 1980 and July 1988, 478 consecutive patients underwent aortic aneurysm operations at Royal Prince Alfred Hospital. Renal function was assessed by measurement of serum creatinine levels. The left renal vein was divided in 28 (8%) of the 355 patients undergoing elective aneurysm resection. The mean immediate postoperative creatinine values were significantly higher after left renal vein division, $193 \pm 174 \mu\text{mol/L}$, compared to $133 \pm 93 \mu\text{mol/L}$ for those whose left renal vein remained intact ($p < 0.05$ by Mann-Whitney U test). **After one month, serum creatinine levels had decreased but were still significantly higher in those patients in whom the left renal vein had been divided, $170 \pm 166 \mu\text{mol/L}$,** compared to those in whom it was left intact $109 \pm 49 \mu\text{mol/L}$ ($p < 0.05$ by Mann-Whitney U test). The suprarenal aorta was cross-damped in seven (25%) of the 28 patients in whom the left renal vein was divided, compared to 21 (6%) of the 327 with the left renal vein intact. A rise in creatinine level was observed after suprarenal aortic cross-clamping. The left renal vein was divided in 17 (14%) of the 123 patients having emergency surgery for ruptured aortic aneurysm, 61 (49%) of whom survived more than 30 days. The mean immediate postoperative creatinine values were significantly higher after left renal vein division, $426 \pm 277 \mu\text{mol/L}$, compared to those in whom the vein was left intact, $178 \pm 136 \mu\text{mol/L}$ ($p < 0.05$ by Mann-Whitney U test). **After one month, serum creatinine levels were still significantly higher in those patients in whom the left renal vein had been divided.** Although division of the left renal vein is a useful way to improve exposure of the juxtarenal aorta, the maneuver is associated with an adverse effect on renal function.

Surg Gynecol Obstet. 1991 Jul;173(1):33-6.

The risk of ligation of the left renal vein in resection of the abdominal aortic aneurysm.

AbuRahma AF¹, Robinson PA, Boland JP, Lucente FC.

Author information

Abstract

The left renal vein can be ligated during aortic operation to attain better access to the perirenal aorta. This maneuver has been considered safe, with a low incidence of postoperative renal complications. This study was done to evaluate the risk of left renal vein ligation and its influence on renal function in patients with elective resection of abdominal aortic aneurysms. The records of 332 patients undergoing elective repair of abdominal aortic aneurysms during a five year period were reviewed. The clinical and operative data of patients who had left renal vein ligation and those who did not were similar. **Left renal vein ligation was not associated with an increased mortality rate but was strongly associated with an increase in serum creatinine level and a clinical diagnosis of postoperative azotemia.** Nine of 13 patients who had left renal vein ligation had postoperative azotemia compared with 21 of 319 patients without left renal vein ligation (p less than 0.001). The mean change of preoperative and postoperative creatinine value was an increase of 1.92 milligrams per deciliter in patients with left renal vein ligation in contrast with 0.26 milligram per deciliter in patients without ligation (p less than 0.00075). Thus, ligation of the left renal vein increases the risk of postoperative renal complications and its use should be selective.



Introduction

Is it Safe to Ligate the Left Renal Vein During Open Abdominal Aortic Aneurysm Repair?

Tapan Mehta, Ryckie G. Wade, and James M.F. Clarke, Norwich, United Kingdom

Background: Open repair of juxta-renal abdominal aortic aneurysms (AAA) sometimes involves the ligation and division of the left renal vein (LRV). Some surgeons advocate repair, but this is not common practice. The aim was to study the effect of LRV ligation on renal function.

Methods: A retrospective audit of all open AAA repairs between February 2004 and September 2007 in our unit was completed. Pre- and postoperative renal function was assessed with the estimated glomerular filtration rate (eGFR), using an established formula.

Results: Two hundred sixty-one open AAA repairs were performed in the study period. The LRV was ligated in 18.8%; mean age was 75.5 years, 35 were men, mean AAA diameter was 7.8 cm, there were 7 elective, 22 urgent, and 19 emergency AAA repairs. Renal function with LRV ligated was compared with the 212 patients without LRV ligation by independent samples *t*-testing. The baseline mean serum creatinine and glomerular filtration rate in the LRV ligated group were 115.1 $\mu\text{mol/L}$ and 60.6, respectively, which were similar to the LRV not ligated group ($p > 0.05$). The renal function at postoperative day 1, day 7, and weeks 2-6 was similar in the two groups ($p > 0.05$). The postoperative renal function on day 1 was significantly worse compared to baseline ($p < 0.05$), but not at day 7 and weeks 2-6 ($p > 0.05$).

Conclusion: In patients undergoing LRV ligation, there is an initial drop in renal function which improves over 2-6 weeks. At each stage, the renal function is similar to patients in whom the LRV is not ligated. LRV ligation is safe during open AAA repair.

Long-term safety of left renal vein division and ligation to expedite complex abdominal aortic surgery

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Background: Left renal vein division and ligation (LRVDAL) is performed to facilitate complex abdominal aortic surgery. Surgeons restore continuity of the vein due to concern that ligation could cause renal compromise or hematuria. However, we report the short and long-term safety of left renal vein division and ligation.

Method: Between 1992 and 2007, we divided the left renal vein in 56 patients (40 males, 16 females) ages 57 to 84 (average 74-years-old) who were treated for aortic occlusive disease (9) or abdominal aortic aneurysm (47). Patients requiring concomitant renal artery reconstruction were excluded from this review. Suprarenal cross-clamp was used in 51 patients with temporary vessel-loop control of the renal arteries. Creatinine (Cr) and glomerular filtration rates (eGFR) were measured pre-, post-, and long-term after surgery. Outpatient records of all patients that had survived more than 12 months were also reviewed in order to evaluate the late effects on renal function or symptoms possibly related to LRVDAL.

Results: Median procedure duration was 157 (61-375) minutes. Median cross-clamp time was 16 (10-45) minutes. Median intensive care unit (ICU) and hospital length of stays were 2 (1-11) days and 7 (4-58) days, respectively. There were no deaths. There were no complications directly related to renal vein ligation. Hematuria, seen in 2 patients, was a result of traumatic insertion of a Foley catheter. Median pre-op and discharge Cr levels were 1.1 mg/dL (0.7-2.4 mg/dL) and 1.1 mg/dL (0.6-2.1 mg/dL), respectively ($P < .5$). Median change in Cr was 0.0 mg/dL and only increased in 14 patients (maximum increase 0.9 mg/dL). Median pre-op and discharge eGFR was 61 mL/minute (28-137 mL/minute/1.73 m²) and 67 mL/minute (32-138 mL/minute/1.73 m²), respectively ($P < .5$). Cr and eGFR in the 2 patients with a Cr of > 2.0 mg/dL remained unchanged post-op. Only 2 patients with a Cr of < 2.0 mg/dL had a post-op Cr > 2.0 mg/dL and both returned to normal by day 3 post-op. Thirty-six patients have been followed for more than a year (median 34.5 months, maximum 144 months) and Cr has remained stable in all but 2 patients. These 2 patients, both with a pre-op Cr of 1.5 mg/dL, subsequently developed Cr levels of 2.1 mg/dL and 2.4 mg/dL but maintained baseline Cr levels for 25 and 34 months, respectively, before demonstrating these elevated levels which have proven to be unrelated to renal vein ligation. Hematuria and flank pain have never been recorded after discharge.

Conclusion: Restoration of left renal vein continuity after LRVDAL may be unnecessary since renal compromise and hematuria was not encountered in this long-term analysis. (J Vasc Surg 2009;50:500-4.)





Objective



- **to evaluate the effect of left renal vein division on the postoperative renal function in abdominal aortic surgery.**

Methods

- **Retrospective review : 890 patients of open aortic surgery**
 - 1) **AAA : 710**
 - 2) **AIOD : 180**
- **Inclusion : 698 patients**
 - 1) **AAA group: n=543**
 - 2) **AIOD group: n=155 (juxta-renal : 50 / infra-renal : 105)**
- **Exclusion : 192 patients**

**Ruptured AAA, Extra-anatomical reconstruction,
Vasculitis, Marfan syndrome, Aortic dissection,
Retroperitoneal approach, Redo-operation,
Aorto-enteric fistula**



Methods



- **Analysis : Propensity score matching**
- **Endpoint**
 - 1) **Renal function : *sCr*, *eGFR* (POD 1, 3, 7, long-term f/u)**
 - 2) **Perioperative major complication : Acute kidney injury**
 - 3) **30 Day mortality**

Baseline characteristics (Pre-PSM)

Characteristic	Non-LRVD (n=632), (%)	LRVD (n=66), (%)	P-value
30 ≤ Age < 50	22 (3.5)	2 (3.0)	0.944
50 ≤ Age < 60	99 (15.7)	11 (16.7)	
60 ≤ Age < 70	219 (34.7)	26 (39.4)	
70 ≤ Age < 79	246 (38.9)	23 (34.9)	
Age ≤ 80	46 (7.3)	4 (6.1)	
Gender (Male)	542 (85.8)	56 (84.9)	0.841
Renal a' reconstruction	21 (3.3)	10 (15.2)	< .001
Group			
Juxta AIOD	34 (5.4)	16 (24.2)	< .001
Infra AIOD	102 (16.1)	3 (4.6)	
Non-ruptured AAA	496 (78.5)	47 (71.2)	
Chronic renal disease			
Stage 1,2	473 (74.8)	47 (71.2)	0.127
Stage 3	128 (20.3)	16 (24.2)	
Stage 4	27 (4.3)	1 (1.5)	
Stage 5	4 (0.7)	2 (3.0)	
Supra-renal clamping	60 (9.5)	36 (54.6)	< .001

Baseline characteristics (Post-PSM)

Characteristic	Non-LRVD (n = 141)	LRVD (n = 63)	P-value *
Renal a' reconstruction	19 (13.2)	9 (14.3)	0.838
Group			
Juxta AIOD	31 (21.7)	16 (25.4)	0.822
Infra AIOD	8 (5.8)	3 (4.8)	
Non-ruptured AAA	102 (72.5)	44(69.8)	
CKD			
Stage 1,2	104 (73.5)	47 (74.6)	0.883
Stage 3	34 (24.3)	14 (22.2)	
Stage 4	1 (0.5)	1 (1.6)	
Stage 5	2 (1.6)	1 (1.6)	
Supra-renal clamping	74 (52.4)	35 (52.4)	1.000

Results

- Preoperative and postoperative **sCr** (mean±SD, mg/dL)

	Non-LRVD (n=141)	LRVD (n=63)	P value*
Preoperative	1.12±0.63	1.14±0.60	0.866
POD 1	1.21±0.62	1.40±0.59	0.045
POD 3	1.15±0.81	1.26±0.83	0.365
POD 7	1.14±0.88	1.33±1.73	0.487
Long – term**	1.33±1.08	1.21±0.78	0.384

* Using independent t-test

**Long-term f/u: 50.2 month ± 45.5

Results

- Preoperative and postoperative **GFR** (mean±SD, mL/min/1.73m²)

	Non-LRVD (n=141)	LRVD (n=63)	P value*
Preoperative	76.1±25.0	72.4±21.3	0.306
POD 1	71.4±26.0	59.5±23.9	0.002
POD 3	77.5±28.5	69.5±26.6	0.065
POD 7	78.5±27.4	73.3±24.8	0.264
Long – term	68.9±27.1	69.0±22.2	0.986



Conclusions



- **The LRVD patients undergo initial drop in renal function, however, sCr and GFR were back to normal range during follow up period.**
- **There was no significant difference in post-operative mortality between LRVD and non-LRVD groups.**
- **LRVD is a safe and durable procedure during complex abdominal aortic surgery.**

Thank you for your attention

