ST VINCENT'S HEALTH AUSTRALIA

Doomed to clot… or not?

Utility of pre-kidney transplant thrombophilia screening on predicting post-transplant venous thromboembolism

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ANZSN ASM 2023

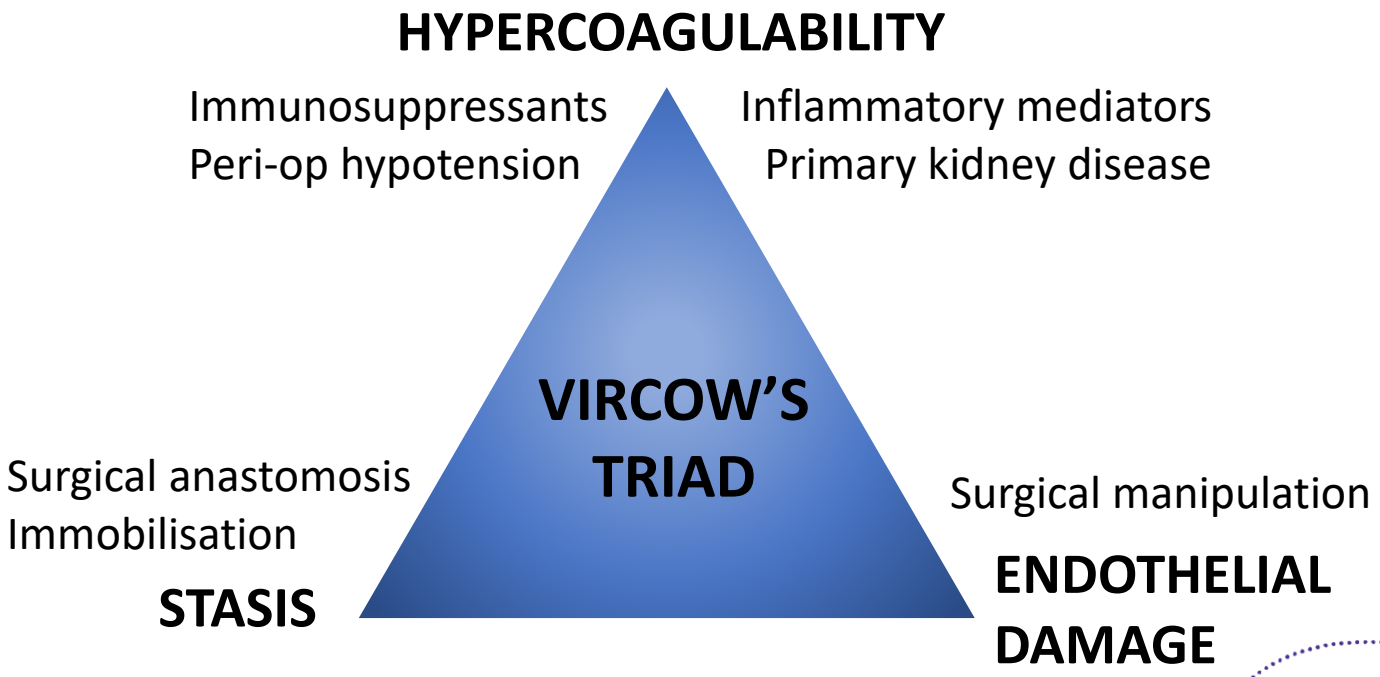
Venous Thromboembolism and Kidney Transplantation

Prevalence 4.6-9.1% post-kidney transplant (KTx) venous thromboembolism (VTE)[1,2]

↑ Graft Loss, ↑ Acute rejection, ↑ Mortality[1,3,4]

Role of inherited thrombophilias?

- Factor V Leiden (FVL) mutation
- Prothrombin gene (PTG) mutation
- Antithrombin III (AT3) deficiency
- Protein C (PC) deficiency
- Protein S (PS) deficiency



[1] Bhargava et al. (2023)
[2] Poli et al. (2006)
[3] Andrassy et al. (2004)
[4] Verhave et al. (2014)

Aims

To determine whether **asymptomatic screening** for inherited thrombophilia can improve post-KTx **prediction of VTE**

To examine whether inherited thrombophilias increase **graft dysfunction**, **acute rejection**, and **mortality**

Methods

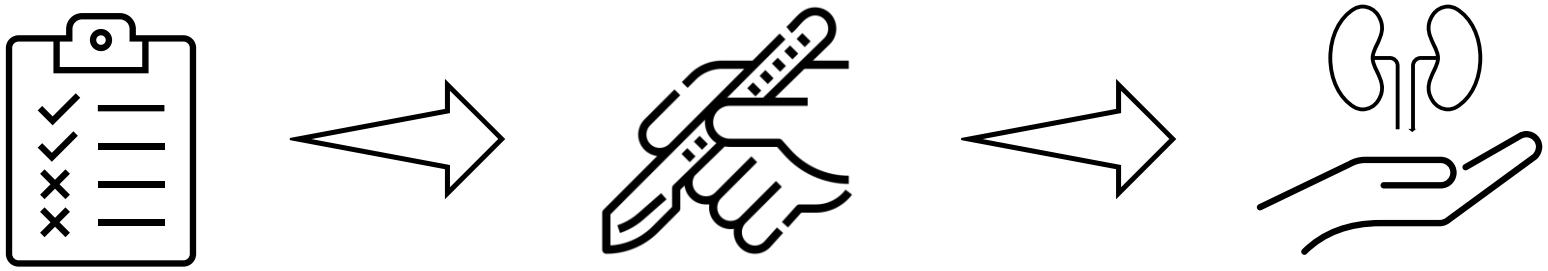
Single-centre retrospective cohort study

April 2014 – March 2022

n=153 consecutive KTx with >6mo follow-up at our centre

Excluded AVF and line-associated thrombus

Statistics: descriptives, Fisher's exact test, Mann-Whitney U test



ASSESSMENT
Thrombophilia screening
History of VTE and risk factors
Primary kidney disease
Cardiac comorbidities

TRANSPLANT
Donor type
Length of stay

FOLLOW-UP
Post-Tx VTE
1yr graft function
Acute rejection
Mortality

Results

Table 1 | Demographic and clinical baseline characteristics in KTx recipients with and without inherited thrombophilia

	No thrombophilia (n=144)	Thrombophilia (n=9)	p
Age, med. (IQR)	55 (18)	60 (6.5)	0.18
Male (%)	97 (67)	7 (77)	0.72
BMI, med. (IQR)	27 (7.6)	27.6 (13.5)	0.64
Smoking Hx (%)	66 (46)	3 (33)	0.51
PHx VTE (%)	6 (4.2)	1 (11)	0.35
ESKD Cause (%)			0.56
GN	54 (38)	4 (44)	
Diabetes	29 (20)	0 (0)	
PCKD	18 (12)	1 (11)	
Reflux	10 (6.9)	2 (22)	
Hypertension	7 (4.9)	1 (11)	
Genetic	7 (4.9)	0 (0)	
Drug	5 (3.5)	0 (0)	
Other or N/A	14 (9.7)	1 (11)	
Co-morbidities (%)			
Hypertension	120 (83)	9 (100)	0.36
Dyslipidaemia	63 (44)	6 (67)	0.30
Diabetes	45 (31)	1 (11)	0.28
IHD	28 (19)	1 (11)	1
PVD	6 (4.2)	0 (0)	1
Dialysis mode (%)			0.71
HDx	73 (51)	5 (56)	
PDx	63 (44)	3 (33)	
Pre-dialysis	8 (5.6)	1 (11)	
Donor type (%)			0.09
DBD	86 (60)	2 (22)	
DCD	33 (23)	4 (44)	
Live donor	25 (17)	3 (33)	

BMI, body mass index; ESKD, end-stage kidney disease; GN, glomerulonephritis; PCKD, polycystic kidney disease; IHD, ischaemic heart disease; PVD, peripheral vascular disease; HDx, haemodialysis; PDx, peritoneal dialysis; DBD, donation after brain death; DCD, donation after circulatory death

Thrombophilia Outcomes

Positive thrombophilia screening was **not** associated with adverse kidney, VTE, and mortality outcomes

Table 2 | Clinical outcomes in KTx recipients with and without inherited thrombophilia

	No thrombophilia (n=144)	**Thrombophilia (n=9)**	**p-value**
Hospital length of stay (d), med. (IQR)	10 (8)	9 (7)	0.59
ICU admission (%)	31 (22)	1 (11)	0.69
Post-KTx VTE (%)			
During follow-up	23 (16)	3 (33)	0.30
Within 1 year	18 (13)	2 (22)	0.63
Within 90 days	14 (9.7)	1 (11)	1
Creatinine 1yr post-KTx (µmol/L), med. (IQR)	117 (55.5)	106 (64.5)	0.51
Rejection 1yr post-KTx (%)	32 (22)	1 (11)	0.69
Graft loss (%)	8 (5.6)	0 (0)	1
Mortality (%)	13 (9.0)	1 (11)	0.59

Post-KTx VTE Predictors

Only age at transplant is a **significant predictor** of post-KTx VTE

Sex, BMI, VTE history were **not predictive**

Table 3 | Risk factors for VTE events in KTx recipients

	No post-KTx VTE (n=127)	Post-KTx VTE (n=26)	p-value
Age, med. (IQR)	55 (18)	60 (12)	**0.04**
Male (%)	89 (70)	15 (58)	0.25
BMI, med. (IQR)	27.1 (8.1)	26.7 (8.9)	0.42
Ex-smoker (%)	60 (47)	9 (35)	0.28
PHx VTE (%)	7 (5.5)	0 (0)	0.60
Length of stay (d), med. (IQR)	10 (7)	11.5 (9)	0.27
ICU admission (%)	24 (19)	8 (31)	0.19

Post-KTx VTEs

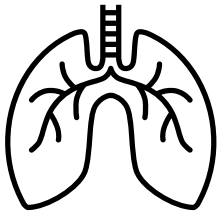
32 VTEs in 26 KTx recipients during follow-up period (median 5 years)

Timing

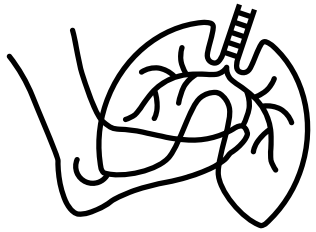
- 15 VTEs within 90 days
- 6 VTEs between 3-12 months
- 11 VTEs beyond 12 months

Location

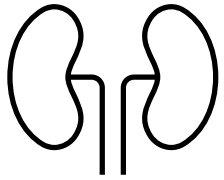
7 leg DVTs
1 arm DVT



14 PEs

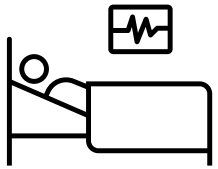


7 DVT + PEs

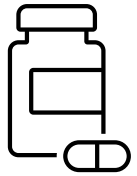


3 RVTs

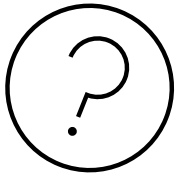
Risk Factors



18 long hospital stay



1 anticoag WH
3 no aspirin



10 unknown

DVT, deep vein thrombus; PE, pulmonary embolus; RVT, renal vein thrombus; WH, withheld

The Cost to Society

Using 2021 figures, based on 5% thrombophilia screen +ve and subsequent haematology clinic referral

	Added to wait-list[5,6]	Thrombophilia testing cost/person[7,8]	Outpatient clinic cost/person[6,7]	Total cost
	925	AU$151.95	AU$283.20	>AU$150,000
	~200	NZ$333.69	~NZ$350	>NZ$70,000

[5] ANZDATA (2022)
[6] Personal correspondence, ASSET study investigators (2023)
[7] Medicare Benefits Schedule (2023)
[8] Auckland District Health Board (2023)

Conclusions

1. There is no utility for asymptomatic screening of thrombophilia in kidney transplant assessment.
2. Thrombophilia positivity is not predictive for graft loss, acute rejection, and mortality.
3. More reliable, objective predictors of VTE are required.

Limitations

- Retrospective cohort study in single tertiary centre
- Small numbers of thrombophilia +ve and pre-KTx VTE

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