Expanding Horizons: AngioVac® Suction Thrombectomy at UTHealth

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AngioVac®

- Large bore 22 Fr cannula with Funnel tip
- Suction to engage and remove
- Emboli trap
- Simultaneous reinfusion of filtered blood
- Simple veno-veno extracorporeal circuit
- No reservoir
- Centrifugal pump
- In-line filter
- Real time reinfusion
Device Approval

Jun 2009    Cannula
Aug 2009    Circuit
Dec 2013    CE Mark
Mar 2014    FDA Expanded indications

“The AngioVac® cannula is intended for use as a venous drainage cannula and for the removal of fresh, soft thrombi or emboli during extracorporeal bypass for up to six hours”
Introduction

- Experience of using novel Vacuum assisted aspiration thrombectomy device AngioVac® (Angiodynamics) is increasing

- No single case series reporting the experience of Vacuum assisted aspiration thrombectomy catheter in both venous and arterial thrombus extraction
Initial Single Center Experience With a New Aspiration Thrombectomy Device For Arterial And Venous Thrombosis


Department of Cardiothoracic & Vascular Surgery / McGovern Medical School / The University of Texas Health Science Center at Houston / Memorial Hermann Heart & Vascular Institute

INTRODUCTION

We report our initial experience with a new vacuum-assisted aspiration thrombectomy device AngioVac (Angiodynamics, Latham, NY) used in combination with a filtered extracorporeal bypass of a single institution.

METHODS

A retrospective review of patients who underwent aspiration thrombectomy using the AngioVac device was performed. Procedures were performed in a hybrid imaging operating room under general anesthesia. After systemic anticoagulation, the AngioVac canula was inserted via open exposure of the access vessel. Intraoperative venograms/arteriograms were used to assess thrombectomy. Postoperatively, duplex scans and computed tomography were used for evaluation and surveillance.

RESULTS

Seven patients underwent successful thrombectomy of illocavoc & femoral/thrombectomy (5), Superco verti can (1) descending thoracic aorta (1) & right atrial (1) occlusive thrombus. Indication for intervention was pulmonary embolism (4), pulmonary embolism (1), SVC syndrome (1), stroke and paradoxic emboli (1). The cannulation site was right internal jugular vein (5), right common femoral vein (1) and right common iliac artery (1). We used extracorporeal venous bypass in 4 patients and arterial bypass in 1 patient. Venous return was via 17 Fr cannula in left common femoral vein (4) and left internal jugular vein (3). Complete thrombus removal was achieved in 4/7 cases and partial thrombus removal in 1/7 cases (procedure halted for hypotension x1; 2 cases). Average O2 time was 3.8 hours. Adjunct rotational thrombectomy device was used in 3/6 (43) cases. Complete resolution of symptoms was present in all patients at the time of discharge. The mean follow-up time was 3.3 months (range 1-5 months). There has been no surgical site infection, bleeding complications or sequelae of thrombectomy.

CONCLUSION

The use of a vacuum-assisted aspiration thrombectomy device AngioVac (Angiodynamics, Latham, NY) is a promising alternative to open thrombectomy in patients with arterial and venous thrombi. This new device should be added to the armamentarium of vascular surgeons.
Study Design

- 08/2015-07/2017
- Memorial Hermann Hospital
- 9 patients

Inclusion Criteria

Outcomes
Study Design

Inclusion Criteria

- Age ≥ 16 years
- All patients undergoing Angiovac® Thrombectomy

Outcomes
Study Design

Inclusion Criteria

Outcomes

- Mortality 0/9
- Complete thrombectomy 8/9
- OR time 188 minutes
- Complications:
  - Hypothermia 1/9
  - Groin hematoma 1/9
AngioVac® Thrombectomy
Site of thrombosis

- Superior Vena Cava
- Descending Aorta and Subclavian Artery
- Right Atrial Mass
- Iliocaval DVT
AngioVac® Thrombectomy
Use of Adjunct Measures

- Rotational thrombectomy device (argon cleaner wire) 6/9 (66%)
- Balloon angioplasty and stenting 3/9 (33%)
Case I
8/8/2015

- 40 year old female:
  - Right lower extremity phlegmasia
- LE swelling symptom onset 4 weeks
- CT scans in Free standing ER`s revealed filling defect in right common iliac vein
- Anticoagulation not administered
Aspiration thrombectomy of Iliocaval DVT
8/9/2015

- General anesthesia
- Hybrid room
- Open insertion of 26 Fr Dryseal sheath:
  - Right IJ
- Percutaneous insertion of 17 Fr Biomedicus cannula in Left CFV
- Extracorporeal Veno-venous
- Right FV Sheath
- Operation halted due to hypothermia with residual thrombus
Aspiration thrombectomy of Iliocaval DVT
8/16/2015

- Use of adjunct mechanical thrombectomy along with Angiovac®
- Successful complete thrombus removal
- 2 year followup with patent IVC and iliac stents
- On antiplatelet therapy now
Case II
9/8/2015

- 67 year old female:
  - 4 weeks post CABG at Tyler, Texas
- Admitted to MHH neurosurgical ICU with:
  - Right ventricular embolism:
    - Pulmonary embolism
  - Left ventricular embolism:
    - Left MCA embolic stroke
    - Left SCA thromboembolism
    - Left LIMA thrombus
  - Floating thrombus in descending thoracic aorta
Aspiration Thrombectomy Thoracic Aortic & L SCA Thrombus

- General anesthesia
- Hybrid room
- Open insertion of 26 Fr Dryseal sheath:
  - Right CFA
- Percutaneous insertion of 17 Fr Biomedicus cannula in Left CFV
- Extracorporeal Arterio-venous
- IVC filter placement to prevent recurrence
Aspiration Thrombectomy
Thoracic Aortic & L SCA Thrombus
Aspiration Thrombectomy
Thoracic Aortic & L SCA Thrombus

- OR time: 5 hours
- Followup: 2 yrs
- ASD closure
- IVC filter retrieved after 12 months
Case III

74 year old male with previous Optease IVC filter placed 10 years ago presents with:

- Dyspnea and chest pain
- Bilateral lower extremity swelling
Case III

- Venous duplex:
  - Extensive bilateral lower extremity DVT

- CT PE protocol:
  - Type B PE

- Systemic anticoagulation started
Aspiration Thrombectomy of Iliocaval DVT
1/14/2016

- General anesthesia
- Hybrid room
- Open insertion of 26 Fr Dryseal sheath:
  - Right IJ
- Percutaneous insertion of 16 Fr Biomedicus cannula in Left IJ
- Extracorporeal Veno-venous
- Right FV & Left FV Sheaths
- Adjunct mechanical thrombectomy by using Argon Cleaner wires
Aspiration Thrombectomy of Iliocaval DVT
1/14/2016
Aspiration Thrombectomy of Iliocaval DVT
1/14/2016

OR time: 2 hrs 30 mins
Follow-up: 18 months
On Xarelto
CASE IV

- 63 year old male with prostate cancer
- Taxotere & Adriamycin via port a cath
- Port a cath was placed on 10/2015

- Right atrial mass identified on Staging CT chest (2/11/2016)
- Associated small pulmonary emboli
CASE IV

- Patient started on anticoagulation
- Chemotherapy halted
Aspiration Thrombectomy of Right Atrial Mass
3/2/2016

- General anesthesia
- Hybrid room
- Intraop TEE
- Open insertion of 26 Fr Dryseal sheath:
  - Right IJ
  - Right CFV
- Percutaneous insertion of 17 Fr Biomedicus cannula in Left CFV
- Extracorporeal Veno-venous
Aspiration Thrombectomy of Right Atrial Mass
3/2/2016

- Position AngioVac in Right Atrium
- Deploy Funnel / Tulip
- Advance AngioVac Cannula
- Initiate and Optimize Flow
- Flush Filter and Repeat
Aspiration Thrombectomy of Right Atrial Mass
3/2/2016

- Position AngioVac in Right Atrium
- Deploy Funnel / Tulip
- Initiate and Optimize Flow
- Advance AngioVac Cannula
- Flush Filter and Repeat
Aspiration thrombectomy of Right Atrial Mass

OR time: 5 hours
Heparin dose: 12,000 Units
Protamine: 100 mg

Intraoperative frozen section: No cardiac tissue
Pathology permanent section: Organized thrombus
3/7/2017

- 1 year follow-up with CT Scan & TTE revealed no recurrence of thrombus or pulmonary lesion
- No evidence of prostate cancer metastasis
Case V:

- 33 year old female
- Large uterine fibroids and metomenorrhagia
- Previous iliac vein thrombolysis and left iliac vein stent *(May Thurner syndrome)*
- Recurrent severe edema LLE
CT Abdomen and Pelvis
Venogram & Angiojet Thrombolysis
MH Sugarland 6/26/2017
Aspiration thrombectomy of Iliocaval DVT
6/30/2017

- General anesthesia
- Hybrid room
- Open insertion of 26 Fr Dryseal sheath:
  - Right IJ
- Percutaneous insertion of 17 Fr Biomedicus cannula in Left IJ
- Extracorporeal Veno-venous Bypass
- Right FV & Left FV Sheaths, Left LSV Sheath
- Adjunct mechanical thrombectomy by using Argon Cleaner wires & angiojet
- Iliac vein stenting
- IVC filter removal
Aspiration thrombectomy of Iliocaval DVT
6/30/2017

- General anesthesia
- Hybrid room
- Open insertion of 26 Fr Dryseal sheath:
  - Right IJ
- Percutaneous insertion of 17 Fr Biomedicus cannula in Left IJ
- Extracorporeal Veno-venous Bypass
- Right FV & Left FV Sheaths, Left LSV Sheath
- Adjunct mechanical thrombectomy by using Argon Cleaner wires & angiojet
- Iliac vein stenting
- IVC filter removal
Aspiration thrombectomy of Iliocaval DVT
6/30/2017
Conclusion

- Angiovac® suction thrombectomy is a promising alternative to open thrombectomy

- Angiovac® should be added to the armamentarium of vascular surgeons
Thank You