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Research Article

MARANTIC ENDOCARDITIS MANAGEMENT

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Abstract:

Non-bacterial thrombotic endocarditis (NBTE) is a well-described phenomenon associated with malignancies due to hypercoagulable state. In the setting of pancreatic cancer, NBTE is more commonly diagnosed postmortem. We describe a case of a man who was diagnosed with pancreatic carcinoma after incidental finding of NBTE. Imaging incidentally revealed multiple strokes, bilateral renal and splenic infarcts, while subsequent workup for cardioembolic source demonstrated a 1.1×0.7 cm mitral valve vegetation. As multiple blood cultures were sterile and patient lacked clinical signs of infection, an underlying malignancy was suspected. CT abdomen demonstrated a dilated pancreatic duct, MRI showed a 2.8×2.2 cm pancreatic head mass. Endoscopic biopsy of the mass revealed pancreatic adenocarcinoma. Other than NBTE, there were no other clinical or laboratory findings to clearly suggest pancreatic cancer. Thus, incidental discovery of this mitral valve vegetation led to the diagnosis of pancreatic malignancy.

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Abdulrahman,
MD.

QR code



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INTRODUCTION:

Non-bacterial thrombotic endocarditis (NBTE), also known as marantic endocarditis, is well documented in the literature phenomenon. This condition arises secondary to hypercoagulable state and has been associated with various malignancies, most commonly, gynaecologic.¹ Pancreatic cancer is the third leading cause of cancer-related deaths in the USA with a 5-year survival rate less than 10%.² Whereas globally, pancreatic cancer is responsible for 331 000 deaths annually and is the seventh most common cause of cancer-related deaths.³ The morbidity and mortality from pancreatic cancer is due to hypercoagulable state resulting in increased incidence of embolic events.¹ Here, we report a case of NBTE as the presentation of underlying pancreatic malignancy. What makes our case unique is that diagnosis of marantic endocarditis in the setting of pancreatic cancer is made postmortem in 1.2% of patients during autopsy.⁴ The diagnostic challenge of marantic endocarditis in living patients is due to the small size of these vegetations, which are often not large enough to be diagnosed on echocardiography; thus, it is not surprising that the first ever antemortem case was reported in 2008.^{4 5} Healthcare professionals need to be aware of the association between marantic endocarditis and pancreatic malignancy, as it may lead to diagnosis and treatment of underlying neoplastic process.

Discharge Information:**Allergies:**Allergic Reactions (Selected)*Severity Not Documented*

Latex Uncoded- Irritation.

Penicillin- Dizzy.

Valium- Dizzy..

Hospital Course:

The patient is a 45 year old woman with Adenocarcinoma of the lung metastatic to the brain and hip, with EGFR mutation, and recent DVT who presented as a transfer. She noticed difficulty getting her words out on 7/8 in the evening which resolved after a few hours. When this returned on 7/9 she went to Beaumont. She also noted left hand numbness that improved after a few hours. She does have left hip pain, as well as left ankle tenderness which has been ongoing after hip arthroplasty in April, with a DVT in the same leg in 6/2019. On admission CT done showed Frontal lobe metastasis(from primary lung adenocarcinoma) with vasogenic edema causing transient expressive aphasia and dysarthria, possible focal seizures, 4 days later neurological deficit worsened MRI showed multiple ischemic infarction in both ant and post circulation

caused Lt side weakness (power zero) light touch intact .Pt was switched from Xeralto she was on for DVT to Hep drip ,meanwhile Trop was 1.15 which started trending down. Cardiology consulted ,TTE done showed EF: 55-60% with non bacterial thrombotic endocarditis which was the cause of ischemic brain infarcts. CTS consulted recommendation made NO surgical intervention d/t metastatic Lung Ca and poor functional status. Pt was made DNR/DNI as this was patient and her family wishes. Pt was d/c to SAR .

Recurrent Acute left posterior cerebral artery ischemic stroke in the setting of anticoagulation, likely secondary to marantic endocarditis

-CT Head 7/22 showed acute Lt post temporal infarction,no hemohrragic transformation.

-MRI 7/14 multiple subacute infarcts throughout the brain.

-on 7/22 worsening neurological defecit(pt could not move Lt foot toes). 7/23 no change in her neurological exam or mentation.

-Carotid duplex 7/23 Rt ICA 40-59% reduced range ,no plaques ,Lt ICA 1-39% , ategrade flow b/l.

Plan:

-Lovenox 80 mg sub BID

-Keppra po bid

-continue Lipitor

Marantic endocarditis, with verracous thrombi on Mitral and Tricuspid Aortic Valves despite anticoagulation therapy .

-TEE Small, minimally mobile, irregular echogenic structures measuring ~0.6 x0.3 cm are noted attached to the atrial aspect of A3, P3 and P1 scallops, features suggestive of non bacterial thrombotic endocarditis (NBTE).

-Lovenox 80 mg subc BID

-F/U with Cardiology as out pt.

Metastatic adenocarcinoma of the right lung:

-Appreciate Oncology recs.

-continue Radiotherapy for now,hold Tagrisso until she finishes radiation

-f/u with Dr. Nagazaka as out pt.

Anxiety:

-on Xanax and was started on Zoloft 50 mg po daily.

Recent DVT:

Provoked after LTHA with decreased mobility. Was on the initial acute dose of Rivaroxaban 15mg PO BID.

-continue enoxaparin l.

-d/c to SAR .

Debility:

pt has multiple recent strokes with metastatic Adenocarcinoma Rt lung with weakness Lt side(power grade zero). Pt unable to do ADL ,IADL.

Pain Management:

-Norco 5 mg po q6h prn prescribed #120 No refill , MAPS reviewed , pt signed Opiod start kit .

Discharge Physical Examination**VS/Measurements****Most recent Vital Signs last 24 hours:**

Temperature: 36.8 using method Oral
BP: 122/80
Pulse: 76
Respiration Rate: 20
SpO2: 98
FIO2: ---
24Hr Tmax: 37.1 using method ---

Weight:

Initial Weight: 85.0 kg 187 lb 07/15
Current Weight: 82.9 kg 182 lb 07/25

, Measurements from flowsheet : Measurements
07/25/2019 11:15 EDT Weight Mode Actual
Weight 82.9 kg
BSA 0
BSA Mosteller 0

Neurological exam

CN:

R homonymous hemianopsia. No facial asymmetry, minimal facial weakness on the left side with involvement of upper face. Hearing is intact bilaterally. Palate elevates in the midline. Tongue protrudes in the midline and moves well from side to side.

Cardiovascular: Regular rate, Regular rhythm, S1 auscultated, S2 auscultated.

Psychiatric: Cooperative, Appropriate mood & affect.

Quality and Safety:

Quality and Safety: At risk for falls: 04/10/2019 07:39 EDT.

MOTOR SYSTEM:

left sided neglect. intermittently wiggle her Lt toes. R extremities antigravity. Tone is increased on the LLE. Bulk appears normal. No adventitious movements. finger-to-nose was impaired on the left.

Discharge Plan:**Discharge Summary Plan**

Discharge Condition: stable.
Discharge instructions given: to patient.
Discharge disposition: Facility: SAR.
Discharge Medications:

SENSORY EXAM: light touch is decreased on the Lt side

MEDICATIONS:

Atorvastatin (atorvastatin 20 mg oral tablet) 1 Tab By Mouth Each Bedtime dexamethasone (dexamethasone 2 mg oral tablet) 1 Tab By Mouth Two times daily enoxaparin (enoxaparin 80 mg/0.8 mL injectable solution) 0.8 mL Subcutaneous Every 12 hours levETIRAcetam (Keppra 500 mg oral tablet) 1 Tab By Mouth Every 12 hours metoprolol (metoprolol tartrate 50 mg oral tablet) 1 Tab By

REFLEXES: Reflexes 1+ LLE only, 3+ throughout
General: Alert and oriented, . Oriented to self ,persons, place but not time. .

HENT: Normocephalic, Atraumatic.

Respiratory: Lungs CTA bilaterally, No wheeze, Respirations are non-labored.

Mouth Two times daily polyethylene glycol 3350 (MiraLax) 1 Pkt By Mouth Daily pantoprazole (pantoprazole 40 mg oral delayed release tablet) 40 mg By Mouth Every 24 hours sertraline (Zoloft 50 mg oral tablet) 1 Tab By Mouth Daily acetaminophen-HYDROcodone (Norco 5 mg-325 mg oral tablet) 1 Tab By Mouth Every 6 hours As Needed For Pain ALPRAZolam (Xanax 0.5 mg oral tablet) 2 Tab By Mouth Daily.

Diagnosis Status:

Progressing as expected.

Education and Follow-up:

Discharge Planning: CHRONIC PAIN, MISAKO NAGASAKA 9/3/2019 13:00:00; PARTHASARATHI CHAMIRAJU Within 2 to 4 weeks Neurosurgery Karmanos Clinic; ANUPAMA KOTTAM Within 2 to 4 weeks Please call 313-745-4525 two weeks after discharge to schedule an appointment with cardiology.

Impression and Plan:

Recurrent Acute left posterior cerebral artery ischemic stroke in the setting of anticoagulation, likely secondary to marantic endocarditis:

- CT Head 7/22 showed acute Lt post temporal infarction, no hemorrhagic transformation.
- MRI 7/14 multiple subacute infarcts throughout the brain.
- on 7/22 worsening neurological deficit (pt could not move Lt foot toes). 7/23 no change in her neurological exam or mentation.
- Carotid duplex 7/23 Rt ICA 40-59% reduced range, no plaques, Lt ICA 1-39%, at-grade flow b/l.

Plan:

- Appreciate Neurology recs.
- Pt on Hep gtt per pharmacy protocol, switched to Enoxaparin sbc as there is no surgical intervention is planned.
- continue Lipitor

Marantic endocarditis, with verrucous thrombi on Mitral and Tricuspid Aortic Valves despite anticoagulation therapy.

- TEE Small, minimally mobile, irregular echogenic structures measuring ~0.6 x 0.3 cm are noted attached to the atrial aspect of A3, P3 and P1 scallops, features suggestive of non bacterial thrombotic endocarditis (NBTE).
- Appreciate Cardiology recs -continue hep gtt per pharmacy protocol, we will switch to Enoxaparin sbc as there is no surgical

intervention is planned.

- CTS consulted for further evaluation. Today 7/24 our team (Primary team) Had a discussion with Dr. Baciewicz regarding final recs. Pt is not a candidate for any surgical intervention from CTS stand point giving the fact of having metastatic Lung Ca and multiple strokes and residual weakness and level of physical activities.
- F/U with Cardiology as out pt.

Metastatic adenocarcinoma of the right lung:

- Appreciate Oncology recs.
- continue Radiotherapy for now, hold Tagrisso until she finishes radiation
- f/u with Dr. Nagazaka as out pt.

Anxiety:

-on Xanax and was started on Zoloft 50 mg po daily.

Recent DVT:

- Provoked after LTHA with decreased mobility. Was on the initial acute dose of Rivaroxaban 15mg PO BID. continue enoxaparin per pharmacy protocol.

Debility:

- pt has multiple recent strokes with metastatic Adenocarcinoma Rt lung with weakness Lt side (power grade zero). Pt unable to do ADL, IADL.
- PT/OT on board
- Today 7/25 pt participated adequately with PT/OT. Recommendation made for need to Physical therapy at a rehabilitation center. Pt Also was re-evaluated today by PM&R and based on pt health condition and level of physical activity, pt would be a candidate for SAR as pt might need longer rehabilitation time on a slower pace.
- SW on board to assist with placement to SAR.

Supportive:

- Periphral IV line
- Diet : 'regualr
- Pain med: Norco 5 mg q4
- GI prophelaxis: PPI
- DVT prophelaxis: Enoxaparin

Dispo: SAR. Currently Pt is medically stable for discharge. SW assisting with placement.

Created by

AL SHAIKHLI MD-Resident, RAAD. Beeper number 8644. Resident.

Attestation**Teaching Attestation**

Attestation/ Supervisor Note: Attestation to progress Note, Participation I saw and evaluated the patient with the Resident, and I reviewed and discussed the patient with the Resident and agree with the Resident's findings and plans as documented above., I agree with (findings & plan, patient seen on 07/25/19), Provider Signature LOHIA MD, PRATEEK.

Impression and Plan (Nurology)

This is a 45 year old lady with history of Lung cancer with mets to brain s/p gamma knife radiation x2 presented on 7/10/2019 for DVT. Patients subsequently developed acute ischemic stroke while on anticoagulation. Patient subsequently found to have nonbacterial endocarditis. Course is complicated with ongoing care of appropriate anticoagulation choice due to patients pancytopenia in the setting of chemotherapy.

Impression:

- # Acute left posterior cerebral artery ischemic stroke in the setting of anticoagulation, likely secondary to marantic endocarditis
- # Hypercoagulable state likely due to malignancy
- # Lung cancer with brain mets
- # Thrombocytopenia

Recommendation:

- CTH was repeated yesterday for concern of worsen of neurologic exam showed a new acute infarction in the posterior left temporal lobe/ left MCA territory, evidenced by new area of hypoattenuation. However, when comparing the CTH to the previous MRI it showed the same infarct in the same distributions
- continue lipitor
- continue keppra
- anticoagulation per primary team
- continue other mnnts per primary team

**No further neurological intervention needed currently
please page 9429 if additional assistance is needed**

Created by

Fatani, Ghadeer. Neurology PGY2 #8516

Carotid u/s

Indication: Thrombus. Portable exam.

On the right, there was evidence of mild uneven fibrous appearing plaque within the proximal internal carotid artery. The peak systolic velocity of the

internal carotid artery was 117 cm/sec with an end diastolic of 43 cm/sec. These velocities and B-mode images are consistent with a 40-59% diameter reduction of the proximal internal carotid artery. The peak systolic and end diastolic velocity of the distal common carotid artery was 80 cm/sec and 22 cm/sec. The peak systolic velocity in the external carotid artery was 79 cm/sec.

On the left, there was evidence of mild uneven fibrous appearing plaque within the proximal internal carotid artery. The peak systolic velocity of the internal carotid artery was 72 cm/sec with an end diastolic of 30 cm/sec. These velocities and B-mode images are consistent with a 1-39% diameter reduction of the proximal internal carotid artery. The peak systolic and end diastolic velocity of the distal common carotid artery was 90 cm/sec and 22 cm/sec. The peak systolic velocity in the external carotid artery was 88 cm/sec.

The vertebral arteries appeared to have antegrade flow direction bilaterally.

Right subclavian artery 104 cm/sec

Left subclavian artery 147 cm/sec

Elevated velocity in right mid ICA no plaque visualized, 40-59% per protocol.

IMPRESSION:

1. On the right, there was a 40-59% diameter reduction range of the internal carotid artery.
2. On the left, there was a 1-39% diameter reduction range of the internal carotid artery.
3. Bilateral antegrade vertebral artery flow.

TO, 0555, aw

Signature Line

FINAL

Interpreted By:

And Verified By: RITS MD, YEVGENIY M

Electronically Signed Date: 07/24/19 05:30

Date Transcribed: ASW 07/23/19 08:50

"I certify that I have personally reviewed the images."

This document has an image

Date of Service

Date of Service: 07/22/2019.

Treatment / Management**Resuscitation Status Order:**

Current Order: I have updated the code status EMR order to reflect the decision in this note.

Patient Decision Making Ability:

Patient is without capacity to make decision, with available surrogate: Patient Surrogate is Family (Family member or another person who is familiar with the patient's wishes/values/beliefs), The surrogate decision maker identified is the patient's (Sister), Discussion about advanced Directives was held with patient surrogate (By YASSIN MD-Resident, AHMED, Details discussed were We have talked to the pt family today and they were in agreement to DNI/DNR status. They explained that is the pt wishes herself and she has expressed this multiple times for them. The pt herself is AOX2 and she also chose to be DNI/DNR).

Oncology:

Impression and Plan

Ms. Gibson is a 45-year-old female with metastatic adenocarcinoma of the lung with involvement of the brain and left hip currently on Tagrisso who presented with Ms. Gibson is a 45-year-old female with metastatic adenocarcinoma of the lung with involvement of the brain and left hip currently on Tagrisso who presented with expressive aphasia, troponinemia, and recent DVT.

Acute left posterior cerebral artery ischemic stroke with multiple embolic strokes due to Muranitic Endocarditis (TEE completed on She is not a candidate for surgical intervention. Neurosurgery and Neurology are on consult. She was on a heparin drip but is being transitioned to Lovenox.

- She will require rehab after discharge. RIM vs SAR.

Recent DVT:

Diagnosed in 6/2019. Patient was initially on rivaroxaban 15 mg p.o. twice daily and transitioned to heparin drip at admission.

- Hematology evaluated patient; she will require lifelong anticoagulation. She will be discharged on Lovenox.

Metastatic adenocarcinoma of the right lung:

Patient follows up with Dr. Nagasaki outpatient. On Tagrisso 80 mg daily starting on 7/11/2019. Will hold Tagrisso until she finishes radiation.

- Will schedule follow up with Dr Nagasaka at discharge.

CT Report

CT HEAD WITHOUT CONTRAST

7/22/2019 1:26 PM

CLINICAL HISTORY: 45 years old Female with recent multiple acute infarctions and lung cancer

metastatic to brain, for assessment of worsening neurological defects

TECHNIQUE: CT-Head/Brain (W/O Contrast) was performed without intravenous contrast administration.

All CT scans at the DMC are performed using dose optimization techniques as appropriate to a performed exam including the following: Automated exposure control, adjustment of the mA and/or kV according to patient size, and use of iterative reconstruction technique.

COMPARISON: Head CT from 7/13/2019 and brain MRI from 7/14/2019

FINDINGS:

Current CT again demonstrates multiple areas of hypoattenuation throughout the brain, most of which corresponds to acute infarctions better visualized on brain MRI from 7/14/2019 as well as vasogenic edema from a metastasis in the left frontal lobe. There is an apparently new area of hypoattenuation in the posterior left temporal lobe, likely representing an acute infarction in the posterior left MCA vascular territory. Other infarctions, the largest of which is in the left occipital and posterior temporal lobes/PCA territory, appears stable and demonstrate no hemorrhagic transformation. Local mass effect in the posterior left cerebral hemisphere resulting in partial effacement of the posterior left lateral ventricle. There is no midline shift or hydrocephalus.

IMPRESSION:

1. Suggestion of a new acute infarction in the posterior left temporal lobe/ left MCA territory, evidenced by new area of hypoattenuation.
2. Multiple areas of hypoattenuation throughout the brain, representing subacute infarctions that are visualized on brain MRI from 7/14/2019 . No evidence of hemorrhagic transformation. Vasogenic edema from a known metastatic lesion in the left frontal lobe, unchanged.

Signature Line

FINAL

Dictated By:

And Verified By: ARONOV MD, RIMMA

Electronically Signed Date: 07/22/19 14:01

Date Transcribed: PWS 07/22/19 13:55

"I certify that I personally viewed the images and performed the interpretation of this procedure."

This document has an image

Impression and Plan**Acute left posterior cerebral artery ischemic stroke with multiple embolic strokes due to Muranitic Endocarditis:**

TEE SHOWED: Small, minimally mobile, irregular echogenic structures measuring ~0.6 x 0.3 cm are noted attached to the atrial aspect of A3, P3 and P1 scallops, features suggestive of non bacterial thrombotic endocarditis (NBTE). Mitral valve leaflet mobility is preserved.

Moderate mitral regurgitation, most prominent between the P1/A1 scallops.

Trileaflet aortic valve. Two small nodular echogenicities measuring 0.5 x 0.7 cm and 0.7 x 0.8 cm seen attached to the ventricular aspect of the left and right coronary cusp margins respectively, suggestive of non bacterial thrombotic endocarditis. Mild aortic regurgitation is noted along the commissure between the right and left coronary cusps. The visualized portions of the proximal left main and right coronary arteries appeared patent.

Pt, Fibrinogen is 131 low, and her LDH is 451

Plan:

- 25,000/25ml @ 900U/hr.
- D/C on Enoxaparin + LMWH subq inj. and teach the family on giving her the injections.
- NO surgical intervention / filter option is available right now.
- Discuss with the family the option of putting her back on DNR/DNI
 - Continue keppra 500mg po bid for seizure prophylaxis.
 - Continue on telemetry while inpatient
 - Continue regular diet
 - Neurology service to continue following
- MRI brain 7/17: showed the same ischemic infarction in the different vascular distributions with some increase in size.
- Switch pt. from Xarelto 20 BID, to Heparin drip.
- Neurology did not recommend aspirin at this time. Discussed with patient and family at bedside about the risks and benefits of starting ASA for stroke prevention. At this time, the risk of bleeding outweigh the benefit especially that she is on anticoagulation. Patient and family express understandings and agreeable to the plan
- Monitor the pt for any bleeding as patient on AG and has thrombocytopenia
 - Finish the patient PM&R - RIM authorization.
- Patient's NIHSS was 21 on 7/13/19. Today is 16

as per neurology.

Previous Work up:

CT head did not show any acute intracranial hemorrhage.

CT Head/Brain: Matched perfusion defect suggesting core infarct in the left occipital lobe with small amount of reversible ischemic penumbra in the left occipital and temporal lobe in the posterior cerebral artery territory.

CTA Neck and Head:

1. Normal CTA neck, **Abrupt narrowing of the distal P2 and P3 segment of the left posterior cerebral artery** likely related to recent infarction.

Dominant left vertebral artery. No significant stenosis, occlusion in the anterior circulation intracranially. No aneurysm.

MRI BRAIN/STEM WITHOUT CONTRAST (7/17/19):

1. Redemonstration of several acute ischemic infarctions in different vascular territories in both anterior and posterior circulations with the largest corresponding to the left temporal lobe, **slightly increased in size from prior examination.**
2. No MR evidence for hemorrhagic conversion.
3. Stable appearance of previously treated left frontal lobe metastases. No definite new intra-axial tumor.

TTE on 7/12/1019 was normal. No PFO or intracardiac thrombus.

#shortness of Breath: Pt. started to have sob since last night, associated with sweating.

- Plan:
- EKG
- Troponin-i

#Troponinemia:

- Troponin today was 1.35 , she has mild sob , and mild sweating.
- Troponin elevation is most likely due to thrombus from the vegetataion of Muranitic endocarditis, that goes to the coronary artery

PLAN:

- Cardiology evaluated patient during stay and recommended to stay on her anticoagulation with heparin.
- monitor the patient.

Hypercoagulable state : likely due to malignancy

EGFR+ stage IV adenocarcinoma of the lung with CNS metastases:

- Oncology and rad-onc are following while inpatient.
- Oncology recommended holding patients Osimertinib for now.
- Code status now changes from DNI/DNR to full code after discussion with the family.
- For pain patient can have dilaudid PO.

Created by

MAHDI MD-Resident, ABDULRAHMAN. Beeper number 7696.

Attestation

Teaching Attestation

Attestation/ Supervisor Note: Attestation to progress Note.

Teaching Attestation/Attestation/ Supervising Physician Note:

Date: July 19, 2019

I personally saw and evaluated the patient on the above date. All pertinent investigations (Laboratory, Radiology and Pathology investigations) have been personally reviewed. The overall case was reviewed and the management and plan of care was discussed by me with the house-staff/ resident(s)/student(s). I concur with the history, examination findings and plan of care noted above in the note except the below:

DATA:

1. Oncologic history-adenocarcinoma,
1. **DVT**
1. Troponin elevation, ECG changes in inferior leads
2. No Kidney function changes
3. Drop in platelets
2. **Multiple areas of strokes** (Clinically, radiologically, spaced in location and occurrence wrt time)-PCA (P2, P3)Left, Right MCA>>>very significant decrease in arterial caliber. MRI on 7/17/2019-?yet another additional stroke.

DIAGNOSES:

Marantic Endocarditis, Stroke, MI

TREATMENT:

1. Heparin, monitor.
2. Risk of hemorrhagic transformation explained to family.

3. Per experts/ Dr Afonso-surgery or any intervention is NOT advised.

CODE STATUS:

Full code for now.

PROGNOSIS:

Unfortunately, may be extremely guarded long term prognosis.

I am personally extremely indebted to Dr. Afonso, Dr Barger, Dr Rajamani, Dr Mack, Dr Sarakbi and their esteemed teams for extensive guidance.

ONCOLOGY/ HEMATOLOGY, PALLIATIVE CARE and OTHER SUBSPECIALTY DECISIONS:

These are not our decisions. All pertinent decisions made by esteemed specialists and implemented as such per protocol in Cancer Center/ Hospital. Patient/ (or Family) understands the risks involved in ongoing therapy/ decisions.

DISCUSSION

In 1888, Zeigler used the term thromboendocarditis to describe thrombi depositing on heart valves. Later, the term evolved into cachectic, or marantic, endocarditis; while finally in 1936, Gross and Friedberg coined 'non-bacterial thrombotic endocarditis'.^{4 7 8}NBTE most commonly affects patients between the fourth and eight decade of life, without a specific gender predilection.⁴ NBTE results from deposition of thrombi composed of platelets and sterile fibrin on heart valves, with associated morbidity and mortality stemming from embolisation of these into the central nervous system.⁹ Mitral and aortic valves are the most common sites of vegetation.¹⁰ Although the pathogenesis of this process still remains unclear, underlying malignancy or high-inflammatory states result in elevated levels of cytokines (tumour necrosis factor and interleukin-1), which in turn cause local tissue damage with activation of coagulation cascade resulting in vegetation formation.⁹ The first ever antemortem case of marantic endocarditis as the presentation of underlying pancreatic malignancy was published in 2008 by Smeglin et al.^{1 5} In pancreatic cancer, these vegetations are often too small and friable, leaving remnants that are not large enough to be identified by echocardiography, making it difficult to diagnose NBTE in a living patient.⁴ Yet, these lesions have significant morbidity with the overall reported incidence of embolic events being 42%, most commonly affecting spleen, kidney, brain and heart, respectively.^{4 11}

In addition to the treatment of underlying

malignancy, the most important guidelines when it comes to treatment of NBTE focus on the use of anticoagulation to prevent recurrent thromboembolic events.

Unfortunately, these stem from general anticoagulation guidelines in malignancy, as there is scarcity of studies specifically in NBTE. Therefore, some suggest the use of low-molecular-weight heparin as the preferred antithrombotic agent, whereas others argue that unfractionated heparin is the therapy of choice.^{9 12 13} Meanwhile, the role of direct oral anticoagulants in cancer-related thrombotic events, and in NBTE in particular, needs to be addressed in further studies.¹³

Learning points:

- Pancreatic cancer is the third leading cause of the cancer-related deaths in the USA with a 5-year survival rate less than 10%.² Whereas globally, pancreatic cancer is responsible for 331 000 deaths annually and is the seventh most common cause of cancer-related deaths.³
- Non-bacterial thrombotic endocarditis (NBTE) is a rare but known presenting feature of pancreatic cancer.
- Healthcare professionals must suspect NBTE in the setting of multiorgan infarcts and lack of infectious signs or symptoms. It is prudent to obtain a transoesophageal echocardiography in the setting of negative transthoracic echocardiography.
- Treatment of NBTE consists of systemic anticoagulation and treating the underlying malignancy.

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