MAYO CLINIC

HOSPITAL THROMBOCYTOPENIA:

NAVIGATING THOSE SCARY THREE LETTER ACRONYMS

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THROMBOCYTOPENIA

<150,000

Decreased production (Cancers, Viral Infections, Chemo, ETOH) *

Increased destruction(ITP, DIC,TTP, HUS,HIT) *

Increased consumption

Dilutional

Sequestration

Drugs

Spurious

CENSUS

Mr. Spots

Mrs. Spots

Mrs. Popcorn

Mrs. Chemo

Mr. Etoh

Mrs. Sofa

Mrs. College

Mr. Seymour

Mrs. Heparin

MR. SPOTS

Past Medical History

None

Past Surgical History

Tonsillectomy

Meds:

Ibuprofen 800mg

Review of Systems:

Epistaxis

“Tiny spots on both my ankles”

Specifically denies fevers or new medications.

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	UA
14	8	22	138	4.8	0.8	57	63	0.2	Neg

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	UA
14	8	22	138	4.8	0.8	57	63	0.2	Neg

Peripheral Smear
No abnormalities seen.

ITP

Most common cause of isolated thrombocytopenia.

5 cases per 100,000 people in US.

Drug induced thrombocytopenia (2-3 days after exposure)

Eltrombogpag? Romiplostim? Rituxan? Splenectomy?

MRS. SPOTS

Past Medical History

None.

Past Surgical History:

None.

Meds:

Melatonin

Review of Systems:

Worried she picked up ITP from her husband.

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	UA
14	8	22	138	4.8	0.8	57	63	0.2	Neg

PLATELET CLUMPING

Traumatic Venipuncture

EDTA dependent antibodies that react with platelet glycoproteins

Sodium Citrate or Heparin

MRS. POPCORN

Past Medical History:

Diverticulosis

Hemorrhoids

Coronary Artery Disease with DES

Recent Klebsiella UTI with Bloodstream infection with PICC

Past Surgical History:

Right Total Knee Replacement

Meds:

Aspirin, Metoprolol, Atorvastatin, Ceftriaxone, PICC site care heparin and saline flushes

Review of Systems:

Painless rectal bleeding x4 days. PICC site cares at home. Didn’t want to “catch the covid”

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	UA
5.8	8	179	138	4.8	1.5	57	63	0.2	Neg

TRANSFUSE?

Impact of More Restrictive Blood Transfusion Strategies on Clinical Outcomes: A Meta-analysis of Systematic Review

Salpeter, MD et al

The American Journal of Medicine

Restrictive versus liberal transfusion strategy for red blood cell transfusions: systematic review of randomized trials with meta-analysis and trial sequence analysis

Holst, et al

BMJ 2015

Outcomes Using Lower vs Higher Hemoglobin Thresholds for Red Blood Cell Transfusion

Carson, MD et al

Journal of American Medical Association 2013

Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB

Carson, MD et al

Annuals of Internal Medicine, 2012

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	UA
8.5	8	94	138	4.8	1.3	57	63	0.2	Neg

MRS. CHEMO

Past Medical History

Large B Cell Lymphoma

Past Surgical History:

Port-A-Cath Placement

Meds:

R-CHOP

Review of Systems:

Epistaxis

TRANSFUSING PLATELETS

- 1 apheresis platelets equal 4-6 units of whole blood
- AABB recommends transfusing to maintain platelets above 10K.
- Central line 20K
- LP 50K
- Major elective surgery 50K
- Stored at room temp (Shelf life 5days)
- Highest risk blood product
- Fever 1/14 Allergic Rx 1/50

Platelet Transfusion: A Clinical Practice Guideline From the AABB

MR. ETOH

Past Medical History

Alcohol

Nicotine

Past Surgical History:

Unknown

Meds:

??????????????

Review of Systems:

Found cutting lawn in winter apparel. Well check called in to local PD.

LABS

Lab	Admission
Hemoglobin	10.2
MCV	101
Platelets	14,000
Sodium	131
Potassium	3.6
Magnesium	0.7
Creatinine	1.4
BUN	28
AST	252
ALT	112
Lactate	4.6
INR	2.1

ETOH

Decreases platelet aggregation 20 minutes after ingestion

Toxic to megakaryocytes

Causes liver disease and splenomegaly

Accelerates platelet apoptosis

Decreased TPO

Extra Credit:

MCV goes Up (Folate)

AST/ALT ratio 2:1 and typically less than 300

Magnesium down

DIC

Sepsis

Malignancy (leukemia, mucinous tumors (eg, pancreatic, gastric, ovarian), and brain tumors).

Trauma (central nervous system)

Infection (Bacterial, COVID)

Obstetrical complications

Intravascular hemolysis

WHAT IS THIS DIC YOU SPEAK OF?

Disseminated Intravascular Coagulation

Coagulation and Fibrinolysis at same time

Blood exposed to procoagulant (TF, LPS)

Acute vs Chronic

DIC MANAGEMENT

Treat underlying disorder

Are they Clotting?

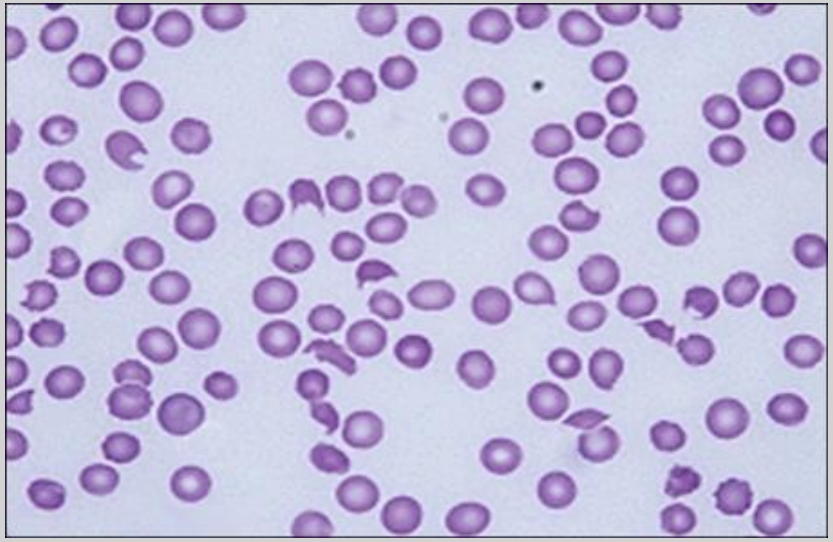
- Clinically overt Art/Ven TE or extensive deposition of fibrin (ischemia/skin infarcts)
- low dose heparin 500-1000u/hr (10u/kg/hr)
- Consider antithrombin replacement

Are they Bleeding?

- FFP replace clotting factors (16cc/kg)
- Cryoprecipitate for fibrinogen (>100)
- Platelets (keep >50K)

Mrs. Sofa is a 45F with history of diabetes is admitted with fever, back pain and dysuria.

- Vitals normal other than fever
- Was mildly confused on exam
- Labs: PLT 20K, Hb 7.8, WBC 17
- AST, ALT, creatinine - normal
- Peripheral smear = Schistocytes



INR	LDH	Coombs	D Dimer	Fibrinogen
1.8	350	Negative	900	100

INR	LDH	Coombs	D Dimer	Fibrinogen
1.8	350	Negative	900	100

MRS. COLLEGE

Past Medical History

Exercise Induced Asthma

GERD

Past Surgical History:

Ankle Fracture Repair

Meds:

Prilosec 20mg daily (noncompliant)

Albuterol (Non Compliant)

Birth Control

Review of Systems:

Binge drinking last night at an “80s” party. Sore throat, fevers, body aches, and abdominal pain.

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	UA
14	14.8	68	138	4.8	0.8	257	157	0.2	Neg - pregnancy

Peripheral Smear
Reactive lymphocytes. Thrombocytopenia.

“FluRona Swab” and Strep Swab
Negative

SPLENOMEGALY

- Viral infections, such as mononucleosis
- Bacterial infections, such as syphilis or endocarditis
- Parasitic infections, such as malaria
- Cirrhosis and other diseases affecting the liver
- Hemolytic anemia
- Blood cancers, such as leukemia and myeloproliferative neoplasms, and lymphomas, such as Hodgkin's disease
- Metabolic disorders, such as Gaucher's disease and Niemann-Pick disease
- Pressure on the veins in the spleen or liver or a blood clot in these veins

MR. SEYMOUR

Past Medical History

Hyperlipidemia

BPH

Meds:

Simvastatin

Flomax

Review of Systems:

Fevers, confused, hematochezia.

Past Surgical History:

Left TKA

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	INR
8.4	11.8	18	138	5.3	1.8	257	57	3.8	0.9

Fibrinogen	Coombs
358	Negative

Peripheral Smear
Schistocytes. Thrombocytopenia.

LABS

HGB	WBC	Plts	Na	K	Cr	AST	ALT	Bili	INR
8.4	11.8	18	138	5.3	1.8	257	57	3.8	0.9

Fibrinogen	Coombs
358	Negative

Peripheral Smear
Schistocytes. Thrombocytopenia.

Test	DIC	TTP/HUS	Liver Disease
Peripheral blood smear	**Schistocytes** **Thrombocytopenia**	**Schistocytes** **Thrombocytopenia**	**Thrombocytopenia**
D-DIMERS Soluble fibrin monomer	**Positive** **Positive**	**Negative** **Negative**	**Positive** **Negative**
PT/PTT Fibrinogen	**Prolonged** **Decreased**	**Normal** **Normal**	**Prolonged** **Decreased**
Factor Assays	**All factors decreased**	**Normal**	**All decreased except FVIII**

STANDARD MANAGEMENT OF TTP

- Plasma Exchange (90% effect-daily till recovery for 48hrs)
- Glucocorticoids (1g daily x3 or 1-2mg/kg daily till CR then taper)
- Rituximab 375mg weekly x4 weeks
- Red Cell Transfusions
- Folic Acid
- Caplacizumab (high risk only)
- Avoid Platelet Transfusion (only for Life threat bleed or procedure)

CAUSES OF TTP

- Drug (Plavix, ticlopidine, cyclosporine)
- Infection
- Pregnancy/ Postpartum
- Autoimmune disorders
- Malignancy
- Stem Cell or Organ Transplantation

TTP

Classic Pentad

- Microangiopathic Hemolytic Anemia
- Thrombocytopenia
- Fever
- Mental Status Changes
- Renal Insufficiency

Clinical "Triad"

- Microangiopathic Hemolytic Anemia
- Thrombocytopenia
- Absence of an alternative explanation (DIC, sepsis…)

TABLE 5

PLASMIC Score for Predicting ADAMTS13 Enzyme Activity

Platelet count < 30 × 10^3 per µL (30 × 10^9 per L)

Hemolysis

No cancer history

No transplantation history

Mean corpuscular volume < 90 μm^3 (90 fL)

Creatinine < 2.0 mg per dL (177 µmol per L)

International normalized ratio < 1.5

PLASMIC score (one point per item present)

0 to 4: low risk (4.3%)
5 to 6: intermediate risk (56.8%)
7: high risk (96.2%)

Note: Low ADAMTS13 enzyme activity is defined as ≤ 10%.

Information from reference 10.

Am Fam Physician. 2018 Sep 15;98(6):354-361.

Mrs. Heparin is a 75 year old female was recently diagnosed with right leg DVT after Ortho surgery for femur fracture.

- Hb 14, WBC 6, PLT 360
- She was started on UFH and transitioned to enoxaparin and discharged to SNF.
- She returns one week later with new onset left arm swelling. An ultrasound shows new DVT. Hb 13, WBC 8, PLT 130

Table 1. 4T Scoring System for Evaluating the Pretest Probability of Heparin-Induced Thrombocytopenia.*

Variable	Score		
	2	1	0
Acute thrombocytopenia	Platelet count decrease of >50% and nadir ≥20,000/mm^3	Platelet count decrease of 30–50% or nadir 10,000–19,000/mm^3	Platelet count decrease of <30% or nadir ≤10,000/mm^3
Timing of onset	Day 5–10, or day 1 if recent heparin exposure	>Day 10 or unclear exposure	≤Day 4 with no recent heparin exposure
Thrombosis	New thrombosis or anaphylactoid reaction after heparin bolus	Progressive or recurrent thrombosis	None
Other cause of thrombocytopenia	None	Possible	Definite
Total score	6–8, indicating high score	4 or 5, indicating intermediate score	0–3, indicating low score

Lo GK, Juhl D, Warkentin TE, Sigouin CS, Eichler P, Greinacher A. Evaluation of pretest clinical score (4 T's) for the diagnosis of heparin-induced thrombocytopenia in two clinical settings. J Thromb Haemost 2006; 4: 759–65

MANAGEMENT

- Stop heparin
- PF4Ab and Serotonin Release Assay?
- Agatroban and Bivalirudin
- Renal➔ argatroban to warfarin
- Hepatic ➔ Bivalirudin to Eliquis/Arixtra
- Doacs ok at treatment dosing

Treat 4wks to 3months

*****20% mortality rate if untreated*****
UFH>LMWH
Treatment dose> Prophylactic dose
Female>Male

QUESTIONS?

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