IN THE NAME OF GOD

A 42 y/o woman present with acute panceratiitis due to hyper TG

Presentation By Amir Hossein Shokravi

9th Aban 1401

Patients ID:

- 42 yrs. old woman
- Born & live in Shemiran
- Married – three children
- Work in Tailoring

Chief Complaint:

She was admitted with **abdominal pain** claiming to have recent Melena from 2 days ago along with and Nausea in 7/26

Pain was localized in **RUQ and LUQ** and **epigastric**

That radiated to Back

She experienced a Minor Truma in her bathroom 2 days before admision

She had multiple Hx of **episodic epigastric pain** that were relived with anti acid and herbal medicines

PMHx :

Hyper lipedemia

Gemfibrosil 300 TDS was started 6 yrs ago with no history of F/O But she discontined Gemfibrosil after 3 yrs and had no replacement

Diabet mellitus Dx from 6 yrs ago

HTN from 2 m ago (under valsartan treatment)

H pylori infection (not documented)

Fatty liver

Family Hx:

- HTN in her mother
- Her father died with Burning
- No definite Hx of Hyperlepidemia in her Family
- Her brother has suspitious symptom of plantar burning But dose not have any lab data

Drug Hx :

H2 blocker and PPI : PRN
Metformin 500 TDS
Gemfibrosil 300 TDS
Valsartan 80
Metronidazol
Amoxicilin
Herbal medicine

- **Habitual History:**
  - Consumption of herbal medicine

- **Social History :**
  - Passive smoker

Review of Systems

- Headache (-) Nausea & Vomiting (+) Visual problems (-)
- Weight changes (-) Appetite changes (+) Sexual problems (-)
- Skin: Pigmentation (-) Diaphoresis (-)
- Ears, nose, mouth: Nl
- Cardiovascular: Nl, Palpitation (-)
- Respiratory: Nl
- Gastrointestinal: nausea + diarrea(-) , Epigastric pain (+)
- Musculoskeletal: Nl
- Neurological: Nl
- Psychiatric: Nl

Physical Examination

- **GENERAL APPEARANCE:**
  - 42 yrs. old woman , ill but not toxic

- **Vital Sign at time of presentation:**
  - BP: 120/80 mmHg
  - HR: 120 / min
  - T : 37.5
  - RR : 20
  - Sat : 95%

Physical Examination:

- BMI : 30
- Head & Neck: (mild counjectival icter) and eye peripheral echymosis
- Thorax: Nl
- Lungs : Clear
- Heart : Normal
- Abdomen : Generalized and special epigastric Tenderness+
- Garding (-) HSM(-)
- Skin: No pigmentation or acantosis nigricants
- Europtive Xanthoma(-) or tuberous scelorosis-
- Extremities :
  - Upper : Normal
  - Lower : Normal
  - BISAP : 1 بدوپذیرش

TG	Chol	Ca	P	Amylase	Lipase
9150	930	13	9.8	313	175
8300	834	13.8	10.1	900	795
8100	503	11.9	11.3	959	731
3620	395	11	10.5	365	186
1638		10.1	11.5	58	45
1028		10	10.5	237	48
1224		6 7/29	9.8	145	32
966		5.9	8.9		
843		6	8.7		
621		5.1	7.3		
536		5.3	7		
651		5.3	6		

WBC	Hb	Plt	Cr	Na	K	BUN
15000	18	297	0.9	139	4	11
11600	16	343	0.8	139	3.9	12
15500	13.9	378	1.4	137	3.8	10
9000	5.8	231	3.6	137	4.2	22
8900	5.6	235	4.7	135	4	29
6800	6.2	214	4.5	137	4.3	31
10000	7.7	223	4.9	137	4.4	39
9900	8.1	197	3.8	139	3.9	39
9300	7.9	174	4.6		5	94

- Patient was admitted in GI service and began this orders:
- NPO
- Serum N/S 3500 / 24h
- Pantoprazol 40 BID
- M.S PRN
- Metro 500 BID
- Cipro 400 BID
- Imipenem 500 QID
- Endocrine consult
- Surgery Consult

Subject of Consultation & Clinical Notes

گزارشات کلینیکی و موضوع مشاوره

Consultant Physician's Observation & Notes

مشاهدات و نظریات پزشک مشاور (خلاصه نظریات، تشخیص، توصیه ها)

Consultant Physician Name & Signature

نام پزشک مشاور و امضاء

Date

تاریخ

BS	509	605	337

Hepatitis	neg
ANA	1.838 +
Anti dsDNA	5.56 -

1401/7/27	
	SG :1015
u/a	Glu +3
	Ket+1

Mg	Uric acid	Alb	LDH	HDL	LDL
1.2	40	3.9	965	38	182
1.5	6	3	2017		125
		2.9	184		
		2			

PH	Pco2	Hco3	BE
7.46	41	29.4	5.9
7.46	41.5	29.4	5.9
7.26	44.1	19.11	-7.7
7.15	48.7	16.4	-12.3
7.24	32.5	13.5	-13
7.1	55.6	16.6	-8
7.28	40	18.2	-7
7.33	33	17.6	-15
7.1	30	11	-14
7.23	29.5	11.9	-15
7.26	36	15.7	-13

مرکز پزشکی آموزشی و درمانی ایت ا... طالقانی

سونوگرافی

مشخصات بیمار: [redacted] تاریخ: ۱۴۰۱/۰۷/۲۶

نام پدر: محمدباقر کد ملی: [redacted]

شماره برگه: ۲۴۷۰۲۳ بخش: اورژانس تحت نظر سرا...

کد پذیرش: ۶۱۳۴۵۰۷ کد شناسایی: ۱۹۷۳۶۲۰

پزشک معالج: -

خدمت درخواستی سونوگرافی کامل شکم و لگن

با سلام

در بررسی اولتراسونیک کبد با سایز نرمال و با اکوی افزایش یافته منتشر کننده (fatty liver grade II) است. حدود کبد منظم است.

قطر مجاری صفراوی داخل و خارج کبدی ،ورید پورت و ورید های هپاتیک طبیعی می باشند.

کیسه صفرا فاقد سنگ بوده ، و شکل و ضخامت جداری طبیعی دارد.

طحال (spleen span = 102 mm) و پانکراس با سایز و اکوی طبیعی مشاهده می شوند.

ضایعه فضاگیر در احشای شکمی فوق مشاهده نگردید.

در بررسی اولتراسونیک کلیه راست با ابعاد تقریبی 115 (11) mm و کلیه چپ با ابعاد تقریبی 108 (15) mm در موقعیت طبیعی دیده می شود.

ضخامت و اکوی کورتکس در هر دو کلیه طبیعی است.اکوی مدولا و سینوس کلیه ها طبیعی می باشد.

علائمی به نفع وجود سنگ ادراری ، هیدرونفروز و ضایعه فضاگیر و کیستیک در کلیه ها مشاهده نمی گردد.

مثانه حاوی ادرار و فاقد ضایعه جداری و اینترالومینال رویت شد.

رحم با ابعاد 55*27 mm و با اکوی نرمال رویت شد.

ضایعه پاتولوژیک در آدنکس ها رویت نشد .مایع آزاد در فضای شکم و لگن رویت نشد.

[redacted]

- Patient became worse during the first night of admission with abdominal distention and oliguria and enhanaced abdominal pain
- On 7/27 the pateint went under hemodiyalysis due to persistent anoric and azotemia
- And as a result of hypotension and call for vasopressor drugs , CRRT was recommended which was started with in a few hours .

The pateint was also diagnosed with Acute panceraitis and was under treatment with Insulin infusion and heparin

ESR	**143**
Pro calcitonin	68/02
CRP	51

[redacted]

Consultant Ph[redacted]s Observation & Notes ۴:۴۰ Am ساعت ۱۴۰۱/۷/۲۷ مشاهدات و نظریات پزشک مشاور (خلاصه نظریات، تشخیص، توصیه ها)

BP = ۸۵/۵۰ [redacted] — dk ⊕

PR = ۱۲۰ [redacted] … hyper TG …

output [redacted] …

Intake = ۱۸۵۰ cc …

out صفر … Vascular access …

RK = 115 mm PTT > 120 [redacted]

LK = 108 mm INR > 5.4 … output …

WBC = 11.6 … IJO …

Hb = 14 … SBP > 90 mmHg … 2hr … UF …

۲۷/۷ PH = 7.24 Na = 137 Plt = 343 …

PCO2 = 44.1 K = 4.8 … HBsAg …

HCO3 = 19.1 LFT … Date ۱۴۰۱ … CVVHD … 6hr … SBP < 90 mmHg …

Consultant Physician Name & Signature — نام پزشک مشاور و امضاء

BUN = 10 Lipase = 731 Ketone 1+ Hb ⊖

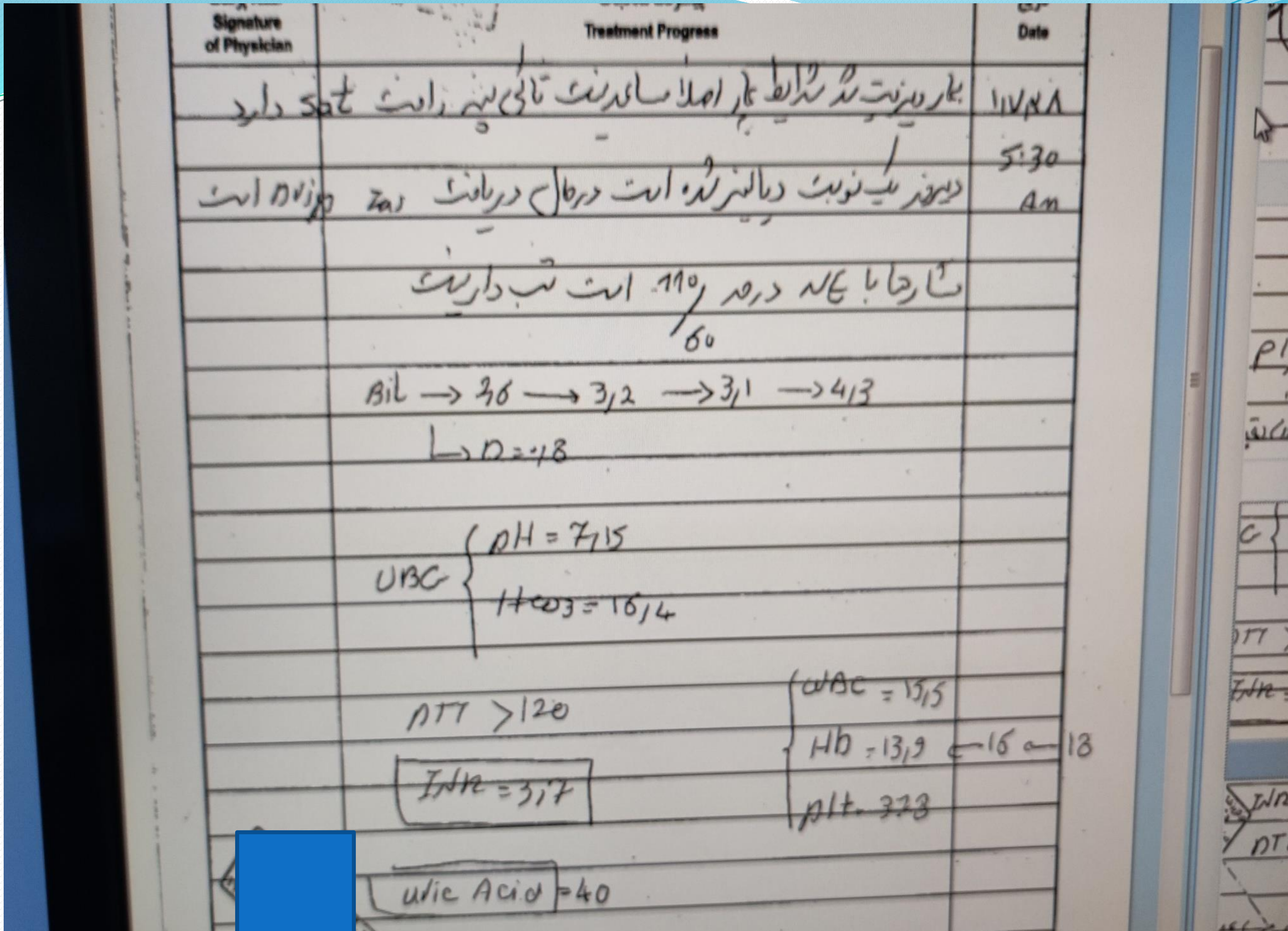
Cr = 1.4 Amylase = 995

TG … ۸۱۰۰ … RBC = 1-2 … CRRT … BUN, Cr … Na, K, VBG …

Ca = 13.8 Bili 2.1 / 1

Ph = 10.1

Anti ds DNA, ANCA, ANA, C3, C4 …



Signature of Physician	Treatment Progress	Date
	بیمار ویزیت شد شرایط بیمار اصلاً مساعد نیست تاکی پنه است sat دارد	۱۱/۷/۹۸
		5:30
	دیروز یک نوبت دیالیز شده است در حال دریافت [illegible] است	AM
	فشارها با NE در حد 110/60 است تب دارند	
	Bil → 3,6 → 3,2 → 3,1 → 4,3	
	↳ D = 4,8	
	VBG { pH = 7,15 ; HCO_3 = 16,4 }	
	PTT > 120	
	INR = 3,7	
	WBC = 15,5 ; Hb = 13,9 ← 16 ← 18 ; Plt = 378	
	Uric Acid = 40	

دانشگاه علوم پزشکی و خدمات بهداشتی درمانی شهید بهشتی

مرکز پزشکی آموزشی و درمانی ایت ا... طالقانی

MRI

[redacted]

خدمت درخواستی: MR کلانژیوگرافی MRCP

یافته ها:

CBD با توجه به تجمع مایع و stranding به خوبی قابل بررسی نیست ، در حد قابل رویت دیلاتاسیون و ضایعه انسدادی در CBD دیده نمی شود.

افزایش ضخامت جداری دئودنوم احتمالا reactive به تغییرات التهابی اطراف دیده می شود.

مجاری صفراوی داخل کبدی : نرمال بدون شواهدی از تنگی یا دیلاتاسیون یا نقص پرشدگی

کیسه صفرا : نرمال

توده کبدی یا صفراوی : دیده نشد.

ورید پورت : نرمال

وریدهای سوپراهپاتیک : نرمال

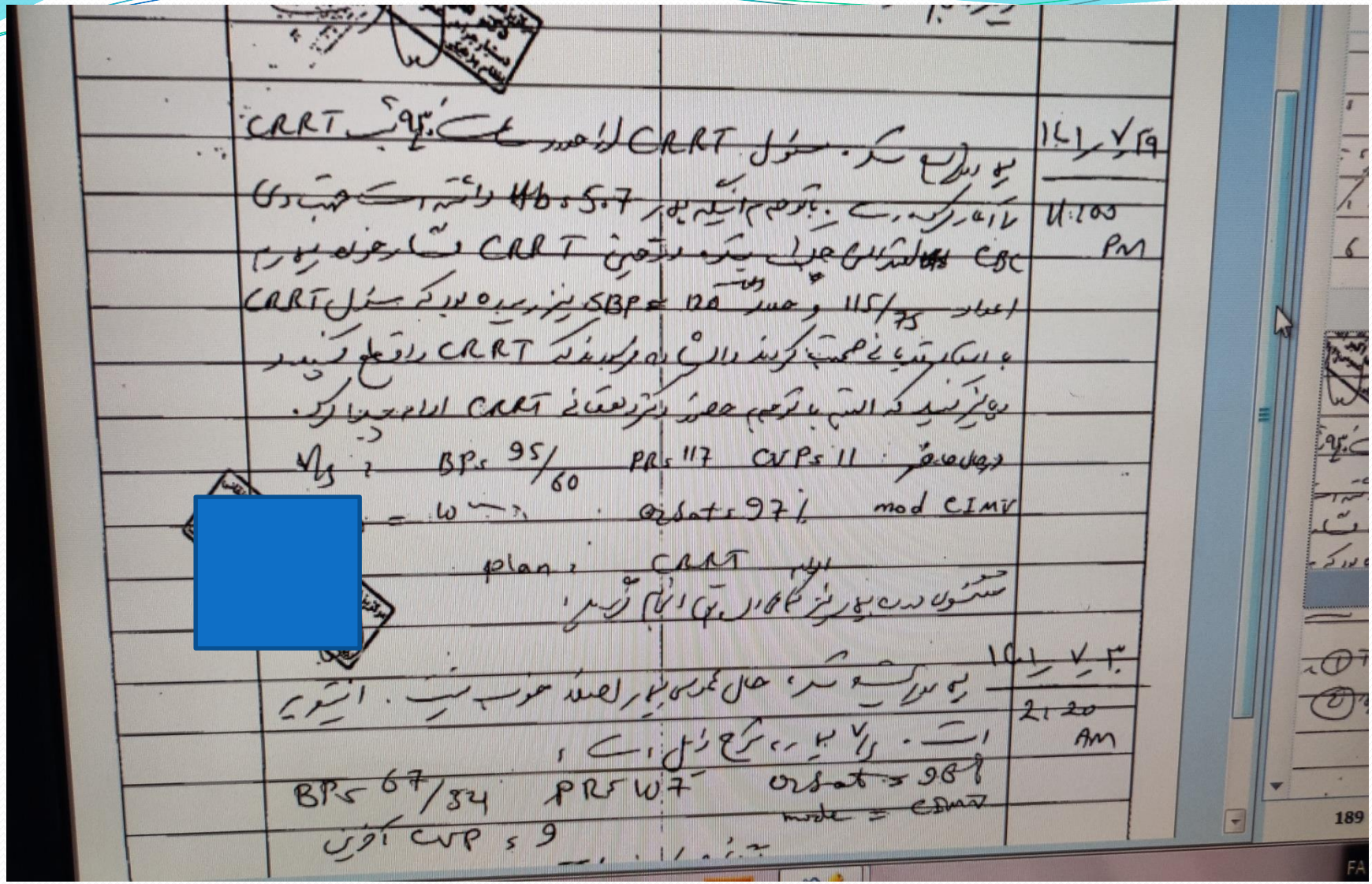
انتهای توده : رویت نشد

کبد : نرمال

طحال : نرمال

هیپرواکسینه و برجستگی پانکراس به همراه تجمع مایع شدید پری پانکراتیک و stranding اطراف مطرح کننده Acute pancreatitis مشاهده می شود.

- On 7/28 the pateint was intubated following LOC and respiratory distresss and admitted in ICU
- On 7/29 despite that CRRT was carried on , the pateint became worse and **Abdominal compartment syndrom** was assumed with surgery consult.
- IAP : 30 (fully catheter)



WBC	Hb	Plt	Cr	Na	K	BUN	Date
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966		5.9	8.9		
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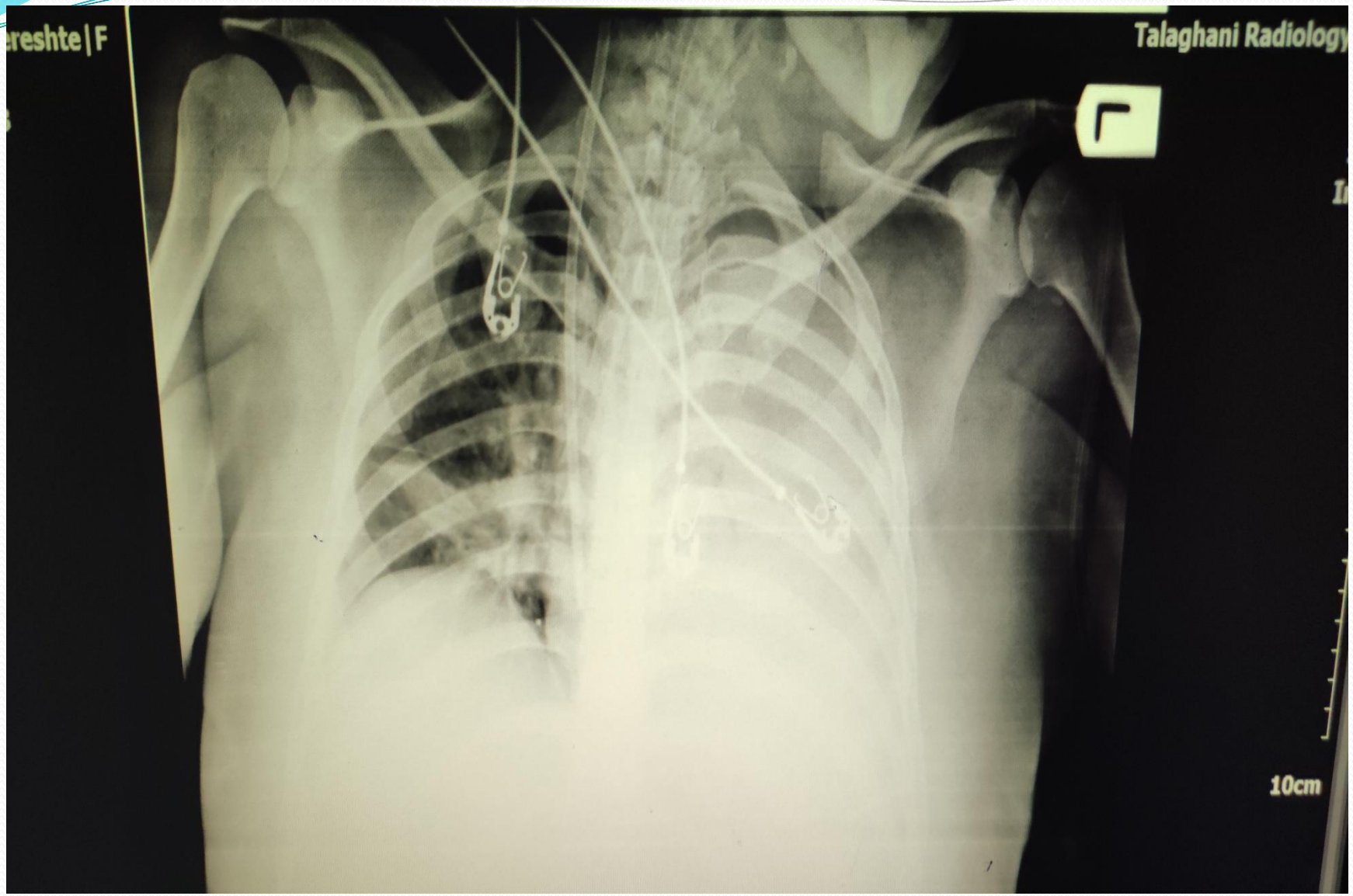
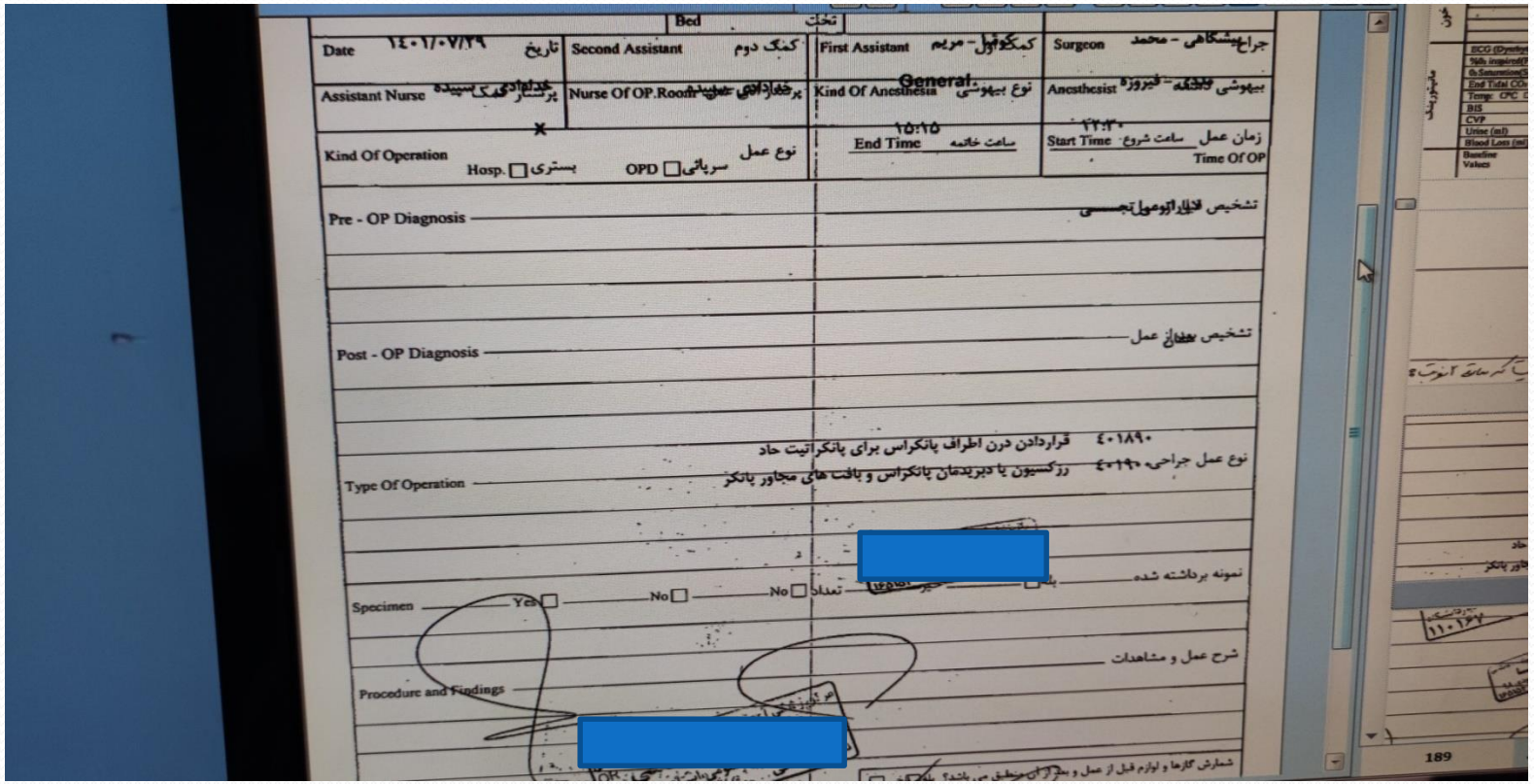
536		5.3	7		
651		5.3	6		

	Bed ۹ تخت		Father's Name محمدباقر نام پدر

امضاء پزشک Signature of Physician	پیشرفت معالجات Treatment Progress	تاریخ Date
	علیرغم انتقال [illegible] CRRT از حدود ۲ ساعت قبل	۲۹/۷/۱۴۰۱
	برای بیمار [illegible] مسئول [illegible] CRRT [illegible]	8:15 PM
	است با سوپروایزر [illegible] هم تماس حاصل [redacted]	
	پیگیری لازم خواهد شد.	
	[illegible] مسئول CRRT [illegible] ساعت ۹:۳۰ شب CRRT	۲۹/۷/۱۴۰۱
	[illegible] Hb = 5.7 داشته است جهت [illegible]	11:00 PM
	[illegible] CBC [illegible] CRRT [illegible]	
	[illegible] 115/75 [illegible] SBP = 120 [illegible] مسئول CRRT	
	[illegible] CRRT [illegible]	
	[illegible] CRRT [illegible]	
	علائم حیاتی: CVP = 11 PR = 117 BP = 95/60 [illegible]	
	mod CIMV O2sat = 97% [illegible]	


reshte | F
Talaghani Radiology
10cm

- On 7/30 the pateint was transfer to the OR for laparatomy and **Necrotizing panceratitis** was confirmed



OPERATION REPORT SHEET

Continue ادامه شرح عمل از صفحه قبل

بیمار خانم ۴۲ ساله مورد پانکراتیت که فشار خون وابسته به نور اپی نفرین و انوریک بود که فشار داخل شکمی ۳۰ داشت که با تشخیص کمپارتمان شکمی به اتاق عمل آورده شد .

بس از پرپ و درپ تحت انستزی جنرال شکم با برش میدلاین باز شد [redacted] ده از داخل شکم ساکشن شد و پانکراتیت بیمار نکروزه کامل بود و تمام مزوی کلون و ناحیهٔ رتروپریتونیال نیز درگیر بود بنسوج نکروزه پانکراس تا حد امکان دبرید شد که حدود ۹۰ درصد از بافت پانکراس نکروزه بود و دبرید شد و با حدود ۲۰ لیتر سرم شستشو داده شد که ترشحات ان شفاف شد دو درن جهت شستشوی شکم تعبیه شد و روی شکم URINE BAG سوچور شد و بیمار به صورت EN ABDOMEN منتقل شد

[redacted]

Post - PO. Prders دستور بعد از عمل

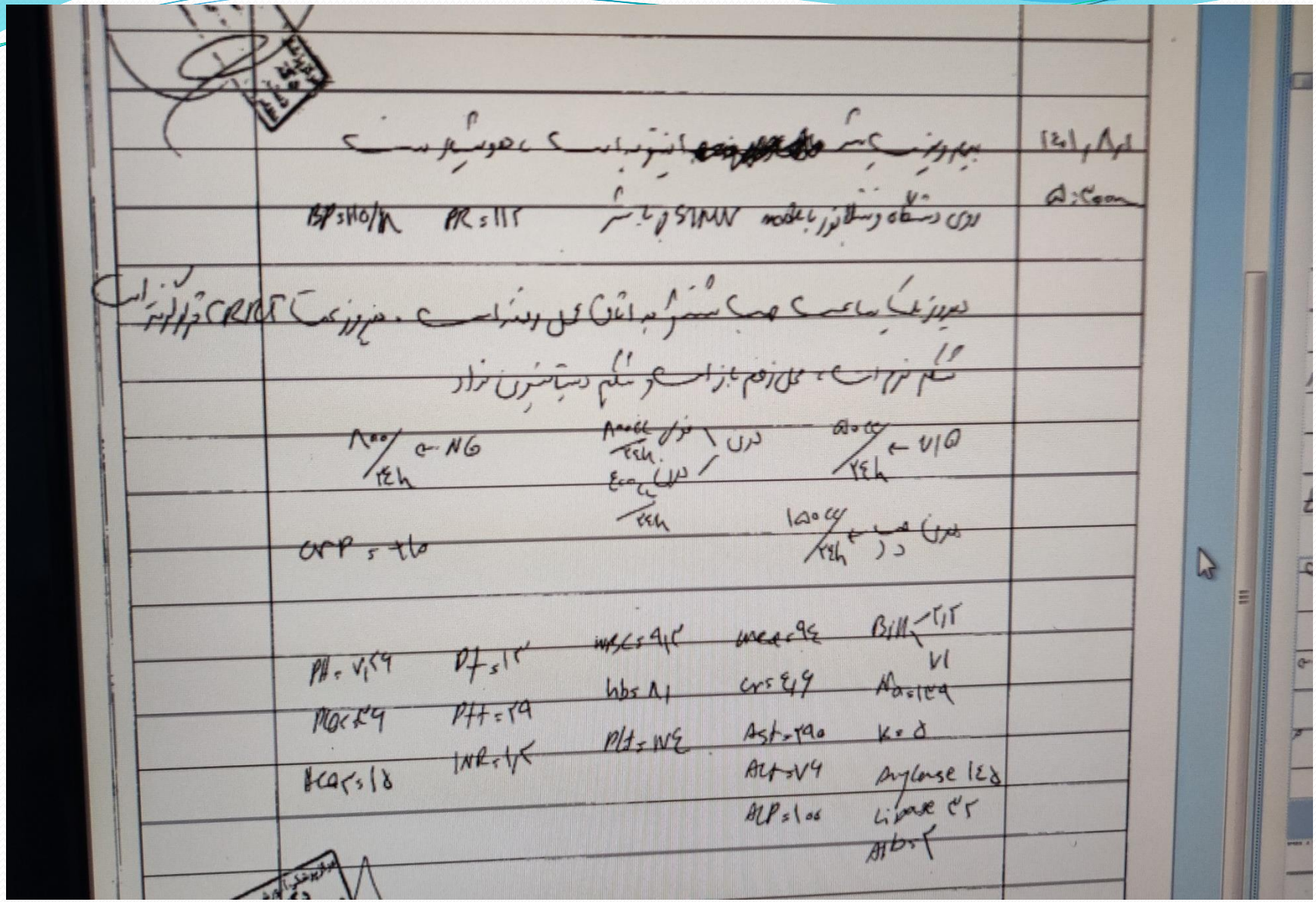
امضاء پزشک Signature of Physician	پیشرفت معالجات Treatment Progress	تاریخ Date
	بیمار ویزیت شد دیروز بعلت distention شکم و درد های بالا [illegible]	۳۰/۷/۱
	بیمار [redacted] ب شد جهت لاپاراتومی و بیمار برای انجام لاپاراتومی به اتاق	
	عمل رفت اما ظاهراً بیمار با تشخیص پانکراتیت نکروزان تحت عمل لاپاراتومی قرار گرفته است!	
	حالا بیمار در حال انجام CRRT است نشانه های بیمار [illegible] NG است [illegible] ↓	
	دارد اینتوبه است	

Bil T = 2.6 → 3.2 → 3.1 → 4.3 → 3.5 → 1.9

D → 0.9

pH = 7.23	PTT = 52	WBC = 8.9
HCO_3 = 11.9	PT = 15.6	Hb = 5.7
pCO_2 = 29.5	INR = 1.5	Plt = 235

Cr = 4.9



- On 8/1 following lack of recovery and maintenance of unstable hemodynemic state, the pateint was unfortunately expired probably as a result of DIC or severe End organ failure due to acute Necrotizing panceraitis.

Signature of Nurses	Signature of Physician	دستورات Orders	ساعت Time	تاریخ Date
[redacted]	[redacted]	به اعلام کد ۹۹ در ساعت 17:50 [illegible]	18:10	۱۴۰۱/۸/۱
		تیم [illegible] بر بالین بیمار حاضر شدم		
		عملیات احیا طبق آخرین پروتکل AHA		
		انجام شد [illegible]		
		علی رغم [illegible] عملیات احیا بیمار در ساعت	[illegible]	
		18:10 فوت گردید		
		با اعلام کد ۹۹ در ساعت 17:20 بلافاصله بر بالین بیمار حاضر شدم. بیمار فاقد نبض مرکزی و ریتم آسیستول بود. بلافاصله ماساژ قلبی آغاز شد. هر ۳-۵ دقیقه اپی نفرین برای بیمار تزریق شد. بیمار اینتوبه بود و متصل به آمبوبگ [illegible] عملیات احیا طبق پروتکل AHA2020 انجام شد. متاسفانه پس از ۴۵ دقیقه احیا، بیمار expire شد و [illegible] عملیات در ساعت 18:05 اعلام شد	18:10	۱۴۰۱/۸/۱
		1) Flat ECG		

AGENDA

Case Presentation

What is the definition, prevalence and cause of panceratitis due to hyper TG ?

Treatment of panceratitis due to hyper TG

What is the time of plasma pheresis in this situation?

What is the rate of mortality in similar cases?

What is the Abdominal compartment syndrom?

PROBLEM LIST

- 42 yrs. old woman
- Acute Abdominal pain
- Severe Hyper Tg (~9150)
- Hx of DM , HTN , HLP
- Melena ?
- Uncontrol BS
- Azotemia due to high IAP

- **Which type of Hyper triglyceridemia is more probable in this case ?**

Fredrickson classification of lipid disorders

Frederickson phenotype	Lipoprotein abnormality	Typical lipid levels
I	Chylomicrons	TG >99th percentile
IIa	LDL	TC >90th percentile; depending upon type, may also see apolipoprotein B ≥90th percentile
IIb	LDL and VLDL	Depending upon type, TC and/or TG ≥90th percentile and apolipoprotein B ≥90th percentile
III	Remnants of VLDL and chylomicrons	TC and TG >90th percentile
IV	VLDL	TC >90th percentile; depending upon type, may also see TG >90th percentile or low HDL
V	Chylomicrons and VLDL	TG >99th percentile

TG: triglycerides; TC: total cholesterol; LDL: low-density lipoprotein; VLDL: very low-density lipoprotein; HDL: high-density lipoprotein.

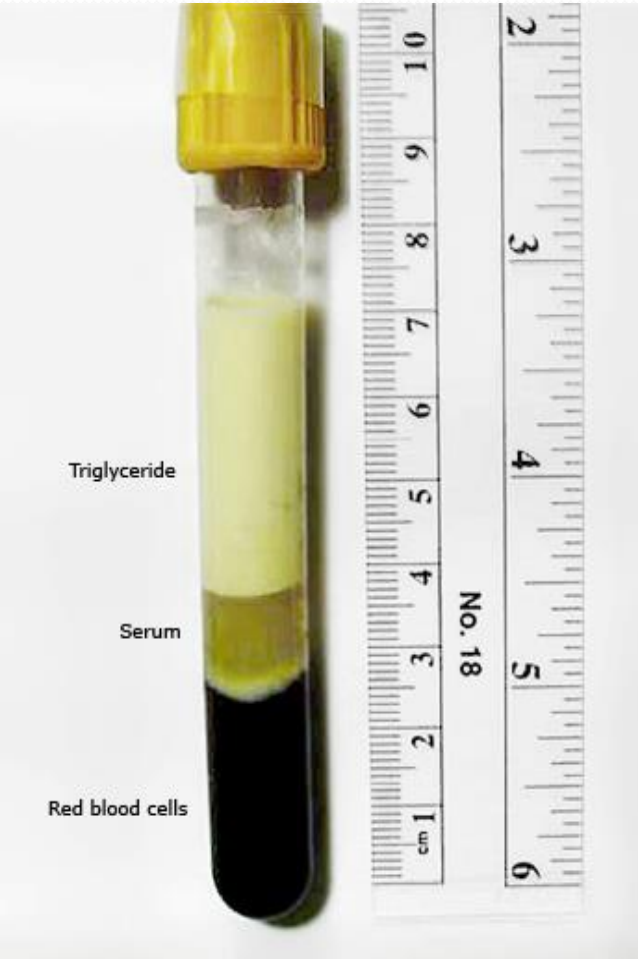
Genetic contributions to hypertriglyceridemia

A. Severe HTG (TG >10 mmol/L)
Monogenic chylomicronaemia (formerly HLP type 1 or familial chylomicronaemia syndrome)
▪ Lipoprotein lipase deficiency (Bi-allelic *LPL* gene mutations)
▪ Apo C-II deficiency (Bi-allelic *APOC2* gene mutations)
▪ Apo A-V deficiency (Bi-allelic *APOA5* gene mutations)
▪ Lipase maturation factor 1 deficiency (Bi-allelic *LMF1* gene mutations)
▪ GPIHBP1 deficiency (Bi-allelic *GPIHBP1* gene mutations)
Multifactorial or polygenic chylomicronaemia (formerly HLP type 5)
▪ Complex genetic susceptibility, **including**
• Heterozygous rare large-effect gene variants for monogenic chylomicronaemia (see above); **and/or**
• Accumulated common small-effect TG-raising polymorphisms (eg, numerous GWAS loci including *APOA1-C3-A4-A5*; *TRIB1*, *LPL*, *MLXIPL*, *GCKR*, *FADS1-2-3*, *NCAN*, *APOB*, *PLTP*, *ANGPTL3*)
▪ Other
• Transient infantile HTG (glycerol-3-phosphate dehydrogenase 1 deficiency) from bi-allelic *GPD1* gene mutations
B. Mild to moderate HTG (TG 2.0 to 9.9 mmol/L)
Multifactorial or polygenic HTG (formerly HLP type 4 or familial HTG)
▪ Complex genetic susceptibility (see above)
Dysbetalipoproteinaemia (formerly HLP type 3 or dysbetalipoproteinaemia)
▪ Complex genetic susceptibility (see above), **plus**
▪ *APOE* E2/E2 homozygosity **or**
▪ *APOE* dominant rare variant heterozygosity
Combined hyperlipoproteinaemia (formerly HLP type 2B or familial combined hyperlipidaemia)

Hypertriglyceridemia-induced pancreatitis (HTGP) causes 1 to 35 percent of all cases of acute pancreatitis and up to 56 percent of pancreatitis cases during pregnancy

The risk of acute pancreatitis increases progressively with serum triglyceride levels over 500 mg/dL (5.6 mmol/L), with the risk increasing ***markedly*** with levels over 1000 mg/dL

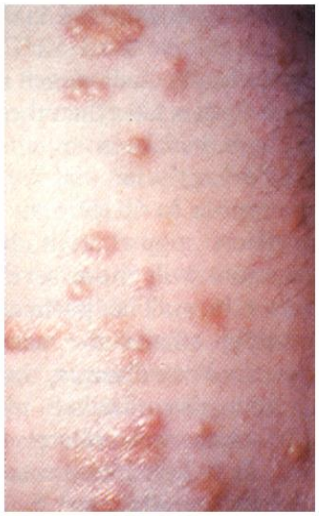
The degree of triglyceride elevation is associated with the severity of acute pancreatitis



Blood sample from a patient with a triglyceridelevel of 1200 mg/dL in a serum separator tube

However, other factors such as the pancreatic lipase activity, the efficiency of clearing fatty acid (FA) from the serum, and the severity of the underlying pancreatic injury are also likely to influence the severity of acute pancreatitis

Eruptive xanthomata



Xanthomata are seen on the extensor surface of the forearm in a patient with severe hypertriglyceridemia.

Stratified analysis and clinical significance of elevated serum triglyceride levels in early acute pancreatitis: a retrospective study.

AU
Wan J, He W, Zhu Y, Zhu Y, Zeng H, Liu P, Xia L, Lu N
SO
Lipids Health Dis. 2017;16(1):124. Epub 2017 Jun 27

ETIOLOGY

Both primary (genetic) and secondary disorders of lipoprotein metabolism are associated with hypertriglyceridemia-induced pancreatitis

Familial chylomicronemia often presents in infancy. It is caused by a reduction in lipoproteinlipase(LPL) activity either due to deficiencies in the *LPL gene product or LPL regulator sencoded by APOC2, APOA5, GPIHBP1, and LMF1 genes or complex genetic risks*

Patients with familial chylomicronemia can present with acute pancreatitis in the absence of an exacerbating condition. The disease frequently manifests ***early in life****, but the diagnosis is often delayed and the median age of diagnosis is 24 years*

Patients develop acute pancreatitis that progresses to recurrent acute pancreatitis and chronic pancreatitis

AUan J, He W, Zhu Y, Zhu Y, Zeng H, Liu P, Xia L, Lu N SO
Lipids Health Dis. 2017;16(1):124. Epub 2017 Jun 27

HTGP is often precipitated by alcohol and a large fatty meal or initiation of a medication that causes HTG

Patients with mixed hyperlipidemia (high chylomicrons and VLDL) have a high risk of acute pancreatitis. However, patients with mixed hyperlipidemia do not have sufficiently elevated serum triglyceride levels to cause acute pancreatitis in the absence of contributing environmental or hormonal factors.

Secondary hypertriglyceridemia — Various conditions can raise triglycerides and lead to HTGP, especially in individuals with underlying genetic risk

- **Diabetes mellitus**
- **Medications** – Hormone supplementation with oral estrogen and selective estrogenreceptor modulator, tamoxifen, can raise serum triglyceride levels
- Other medications associated with elevated serum triglyceride levels include clomiphene,protease inhibitors, antiretroviral agents, propofol, olanzapine, mirtazapine, retinoids,thiazide diuretics, and beta-blockers

- **Pregnancy – Although pregnancy causes an increase in serum triglycerides that peaksin the third trimester, the total serum triglyceride level rarely exceeds 300 mg/dL (3.3mmol/L), a concentration that is not sufficient to cause acute pancreatitis.**

- **Alcohol – Alcohol may elevate triglyceride levels in patients with an underlying genetic hyperlipidemia In most other patients, triglyceride elevations with alcohol intake are transient and likely to be an epiphenomenon rather than a cause of pancreatitis**

Lipid intolerance does not account for susceptibility to alcoholic and gallstone pancreatitis.
AU
Haber PS, Wilson JS, Apte MV, Hall W, Goumas K, Pirola RC
SO
Gastroenterology. 1994;106(3):742

Assessment for worrisome features — Worrisome features in patients with HTGP includethe following:

- Hypocalcemia
- Lactic acidosis

Signs of worsening systemic inflammation

Triglycerides themselves do not appear to be toxic. Rather, it is the breakdown of triglycerides into toxic fatty acids (FA) by pancreatic lipases that is the cause of lipotoxicity during acute pancreatitis

- The severity of acute pancreatitis in patients with hypertriglyceridemia (HTG) is dependent on both the inflammatory response caused by pancreatitis itself, plus the injury caused by lipotoxicity from triglyceride hydrolysis.
- Pancreatitis does not cause hypertriglyceridemia directly. It is possible that in some patients(body mass index [BMI] >40) the stress of a severe inflammatory response to acute pancreatitis will cause some level of triglyceride increase, but dietary indiscretion prior to the onset of acute pancreatitis cannot be excluded.

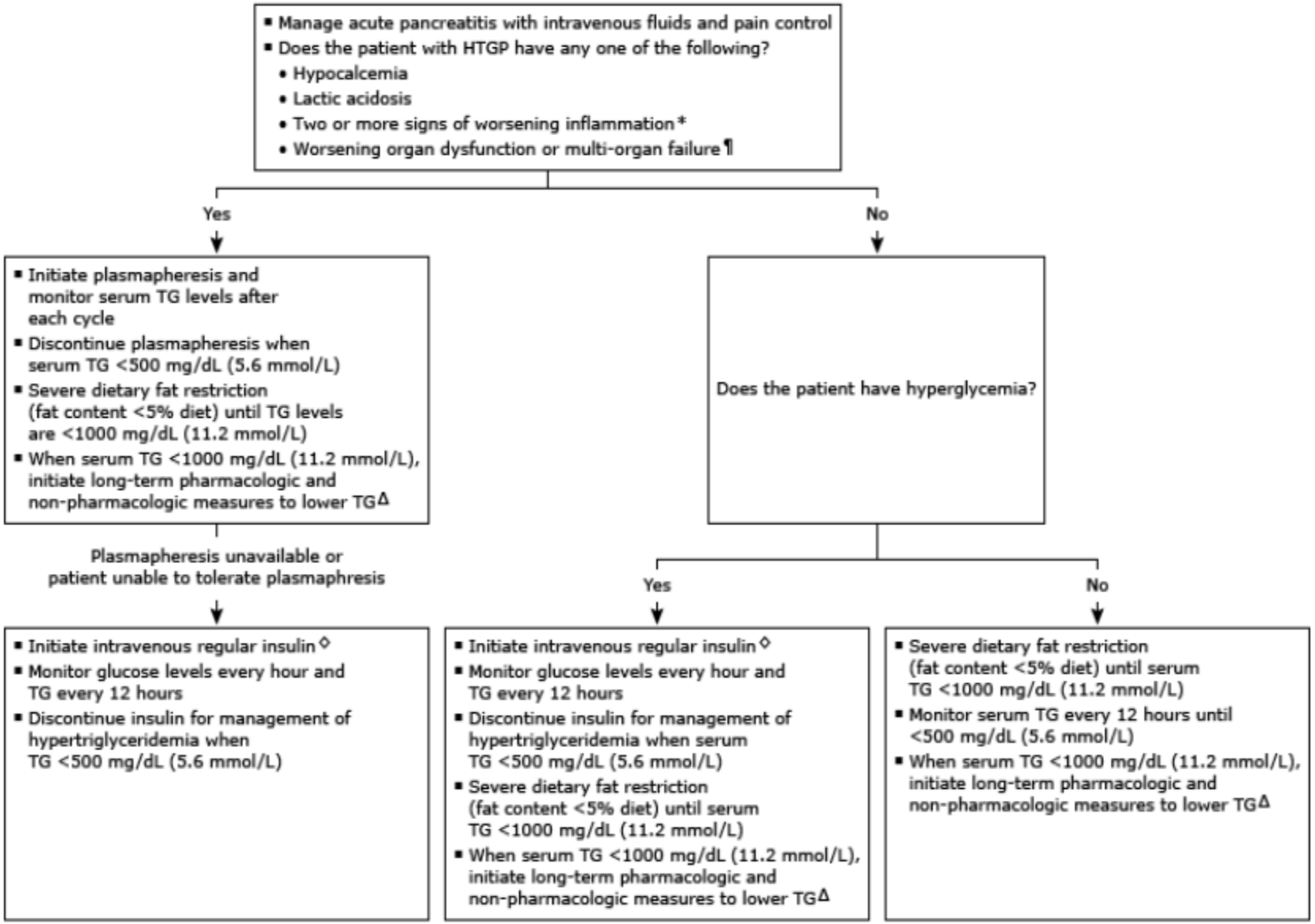
INITIAL MANAGEMENT

Management of patients with hyper triglyceridemia-induced pancreatitis (HTGP) includes treatment of acute pancreatitis(Initial therapy including bowel rest, intravenous fluids, and symptomatic treatment should be initiated

reduction of serum triglyceride levels with the goal of preventing necrotizing pancreatitis and organ failure. In patients with HTGP, maintenance of triglyceride levels below 500 mg/dL (5.6 mmol/L) may expedite clinical improvement

Hypertriglyceridemia-induced pancreatitis: updated review of current treatment and preventive strategies.
AU
Rawla P, Sunkara T, Thandra KC, Gaduputi V
SO
Clin J Gastroenterol. 2018;11(6):441. Epub 2018 Jun 1

Approach to the management of the adult patient with hypertriglyceridemic pancreatitis



Insulin — We administer intravenous (IV) insulin in patients with worrisome features of HTGP in whom plasmapheresis is indicated but is unavailable or cannot be tolerated. As insulin can decrease both triglyceride and glucose levels, we also administer insulin inpatients with HTGP with diabetes to manage hyperglycemia :

plasma glucose >180 mg/dL

PubMed
TI
Insulin can be used to treat severe hypertriglyceridaemia in pregnant women without diabetes.
AU
Ali AS
SO
BMJ Case Rep. 2021;14(7) Epub 2021 Jul 21.

Insulin decreases VLDL triglyceride production and also lowers serum triglyceride levels by enhancing lipoprotein lipase (LPL) activity, an enzyme that accelerates chylomicron and VLDLmetabolism to glycerol and fatty free acids (FFAs)

Insulin also **inhibits hormone-sensitive lipase** in adipocytes, which is the key enzyme for breaking down adipocyte , triglyceride and releasing fatty acids (FAs) into the circulation. Insulin lowers triglyceride levels, but the goal of insulin therapy in severe acute pancreatitis associated with severe HTG is to reverse the stress-associated release of FAs from adipocytes.

Hyperglycemic crises in adult patients with diabetes.
AU
Kitabchi AE, Umpierrez GE, Miles JM, Fisher JN
SO
Diabetes Care. 2009;32(7):133

- In patients with worrisome features of HTGP, we typically initiate an IV infusion of regular insulin at a rate of 0.1 to 0.3 units/kg/hour while closely monitoring blood glucose levels. Inpatients with blood glucose levels between 150 and 200 mg/dL, we administer a separate 5percent dextrose infusion to prevent hypoglycemia due to the insulin infusion. Triglyceridelevels should be monitored every 12 hours
- IV insulin should be stopped when triglyceride levels are <500 mg/dL (5.6 mmol/L).
- IV insulin may be more effective than subcutaneous insulin in severe cases of HTGP and is easier to titrate than subcutaneous administration of insulin

Association of elevated serum triglyceride levels with a more severe course of acute pancreatitis: Cohort analysis of 1457 patients.
AU
Pascual I, Sanahuja A, García N, Vázquez P, Moreno O, Tosca J, Peña A, Garayoa A, Lluch P, Mora F
SO
Pancreatology. 2019;19(5):623. Epub 2019 Jun 1

Additional measures in selected patients

Plasmapheresis

Evidence to support the use of plasmapheresis in patients with HTGP is from observational studies; randomized trials are lacking

A single session of plasmapheresis has been reported to lower triglyceride levels by 50 to 80 percent.However, studies have not demonstrated an improvement in outcomes in patients with HTGP. One prospective study of plasmapheresis, which examined 60 patients with HTGP who underwent plasmapheresis, found no statistical difference in mortality and local complications between those who received plasmapheresis and historical controls

However, the benefit of early initiation of plasmapheresis has not been consistently demonstrated

Factors affecting outcome in acute hypertriglyceridemic pancreatitis treated with plasma exchange: an observational cohort study.
AU
Gubensek J, Buturovic-Ponikvar J, Romozi K, Ponikvar R
SO
PLoS One. 2014;9(7):e102748. Epub 2014 Jul 2

Plasmapheresis does not appear to improve outcomes in uncomplicated cases of HTGP (?)

In one study that included 67 patients without multi organ dysfunction, there was no significant benefit to either mortality or length of stay with the use of t plasmapheresis to medical management, even when patients presented with high levels of triglycerides **(>1000)**

plasmapheresis shoud be continue until triglyceride levels are below <1000 mg/dL (11.3 mmol/L)

Plasma exchange in severe hypertriglyceridemia a clinical study.
AU
Kadikoylu G, Yavasoglu I, Bolaman Z
SO
Transfus Apher Sci. 2006;34(3):253

Another Study :

Plasmapheresis (PEX) rapidly removes TGs and chylomicron from the circulation removing the inciting factor and halting the further inflammation and damage to the pancreas.

PEX lowers the lipid levels drastically within hours compared to conservative therapy that usually takes several days to achieve the same reduction in TG levels.

Most patients require only one session of PEX as it is reported to lower TG levels by 50-80%.

Outcomes not only by lowering TG levels but also by removing Pro inflammatory markers and cytokines to down regulate the inflammatory process in HTG-AP

C. Stefanutti, G. Labbadia, and C. Morozzi, "Severe Hypertriglyceridemia-
Related Acute Pancreatitis,"*Therapeutic Apheresis and Dialysis, vol. 17, no. 2, pp. 130–137, 2013.*

Although multiple case series report the benefit of PEX in management of

HTG-AP, the only prospective study to date with a historic control (60 versus 34 patients) failed to show any mortality

Benefit compared to conservative management.

J.-H. Chen, J.-H. Yeh, H.-W. Lai, and C.-S. Liao, "Therapeutic plasma exchange in patients with hyperlipidemic pancreatitis," *World Journal of Gastroenterology, vol. 10,no. 15, pp. 2272–2274,* 2004.

However, another recent large retrospective study including 111 patients treated with PEX also found no mortality benefit in patients who received early PEX (within 36 hours) versus late PEX (>36 hours) for HTG-AP

The authors also reported a significantly lower mortality in patients who received citrate anticoagulation (1%) during PEX compared to heparin anticoagulation (11%) (P = 0.04); however, 24% patients in heparin group had severe pancreatitis as compared to citrate group (14%) but the difference was not statistically significant

J.Gubensek, J. Buturovic-Ponikvar, K. Romozi, and R. Ponikvar, "Factors affecting outcome in acute hypertriglyceridemic pancreatitis
treated with plasma exchange: An observational cohort study," *PLoS ONE, vol. 9, no. 7, Article ID e102748, 2014.*

High-Volume Hemofiltration (HVHF) and Hemoperfusion (HP)

Continuous venovenous filtration is commonly used for severe acute pancreatitis and has shown good results including mortality benefit; however roles of hemofiltration in HTG-AP have been recently explored. Mao et al. in 2003 studied the role of hemofiltration in HTG-AP by employing hemofiltration in patient with HTG induced severe acute pancreatitis

E.-Q. Mao, Y.-Q. Tang, and S.-D. Zhang, "Formalized therapeutic guideline for hyperlipidemic severe acute pancreatitis," *World Journal of Gastroenterology, vol. 9, no. 11, pp. 2622–2626,* 2003.

High-Volume Hemofiltration (HVHF) and Hemoperfusion (HP)

There was statistically significant reduction of serum TGs, IL-10, and APACHE II score with no mortality in severe acute pancreatitis patients

E.-Q. Mao, Y.-Q. Tang, and S.-D. Zhang, "Formalized therapeutic guideline for hyperlipidemic severe acute pancreatitis," *World Journal of Gastroenterology, vol. 9, no. 11, pp. 2622–2626,* 2003.

Heparin releases stored lipoprotein lipase from the endothelial cell thus lowering TGs levels. Combination of insulin and heparin has been used to lower TGs level in case reports and case series with mean decrease of TGs level by 50% within 24 hours

D. Jain and J. Zimmerschied, "Heparin and insulin for hypertriglyceridemia-induced pancreatitis: case report,"*TheScientific World Journal, vol. 9, pp. 1230–1232, 2009.*

P. Jain, R. R. Rai, H. Udawat, S. Nijhawan, and A. Mathur, "Insulin and heparin in treatment of hypertriglyceridemiainduced pancreatitis,"*World Journal of Gastroenterology, vol. 13,* no. 18, pp. 2642-2643, 2007.

Continuous intravenous heparin administration in humans causes a decrease in serum lipolytic activity and accumulation of chylomicrons in circulation.
AU
Weintraub M, Rassin T, Eisenberg S, Ringel Y, Grosskopf I, Iaina A, Charach G, Liron M, Rubinstein A
SO
J Lipid Res. 1994;35(2):229

There is a concern of rebound hypertriglyceridemia as long term or continuous heparin infusion has been shown to deplete LPL, leading to reduction of chylomicrons catabolism and increase in TGs levels.

Low molecular weight heparin has also been shown

to lower LPLs level similar to conventional unfractionated heparin infusion

due to concern of rebound hypertriglyceridemia and risk of hemorrhage into the pancreas during acute attack on continuous heparin infusion, heparin should preferably be Avoided in some cases.

B. Nasstrom, B. G. Stegmayr, G. Olivecrona, and T. Olivecrona, "Lower plasma levels of lipoprotein lipase after infusion of low molecular weight heparin than after administration of conventional heparin indicate more rapid catabolism of the enzyme," *Journal of Laboratory and Clinical Medicine, vol. 142,* no. 2, pp. 90–99, 2003.

Combined Blood Purification Therapy (CBPT)

CBPT is a two-step approach for management of acute severe pancreatitis involving plasmapheresis and continuous venous hemofiltration. Coupled plasma filtration adsorption combined with CVVH has been shown to improve mortality and lowering of inflammatory markers in severe acute pancreatitis irrespective of etiology of pancreatitis

C.He, L. Zhang,W. Shi et al., "Coupledplasmafiltrationadsorption combined with continuous veno-venous hemofiltration treatment in patients with severe acute pancreatitis," *Journal of Clinical Gastroenterology, vol. 47, no. 1, pp. 62–68, 2013.*

Lipid management — Patients recovering from HTGP require long-term therapy to preventrecurrent acute pancreatitis and to prevent other complications of HTG

This consists of both pharmacologic therapy (oral gemfibrozil 600 mg twice daily) and dietary modification with restriction of fat content to 10 to 15 percent of the diet and avoidance of concentrated sugars. Other non pharmacologic interventions include weight loss in patients who are obese, aerobic exercise, avoidance of medications that raise serum triglyceride levels, and strict glycemic control in diabetics.

AGENDA

Case Presentation

What is the definition, prevalence and cause of panceratitis due to hyper TG ?

Treatment of panceratitis due to hyper TG

What is the time of plasma pheresis in this situation?

What is the rate of mortality in similar cases?

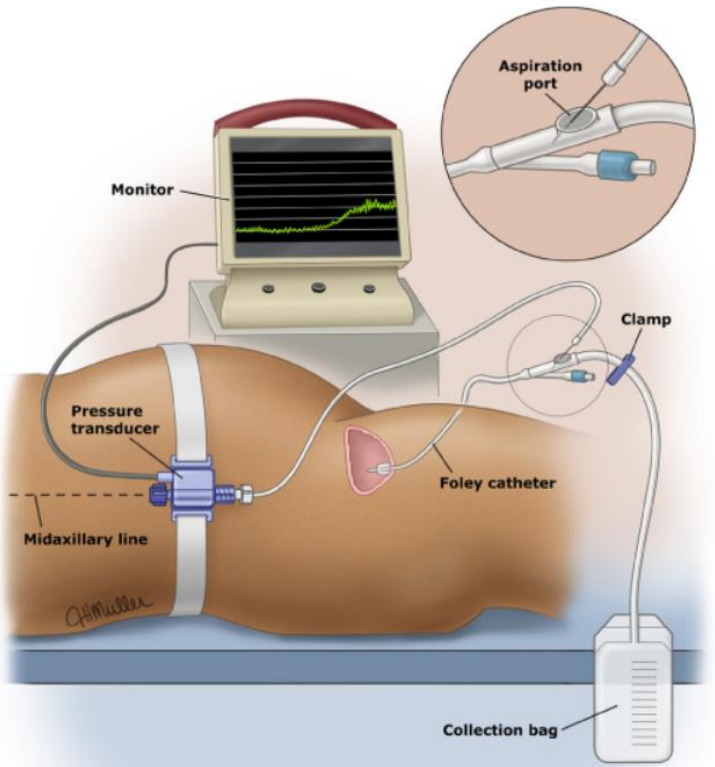
What is the Abdominal compartment syndrom?

abdominal compartment syndrome in acute pancreatitis

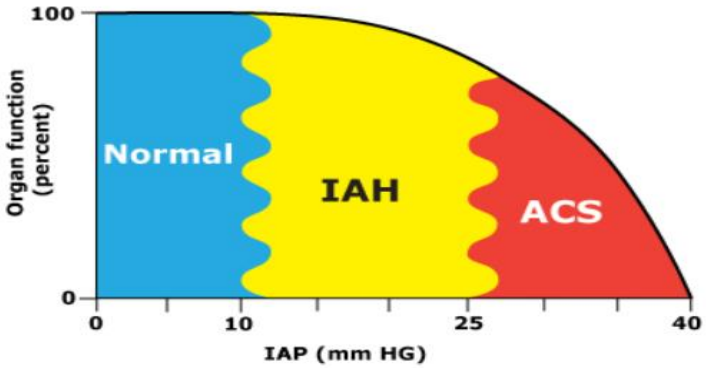
There was a clear correlation between the maximum IAP value within the first 2 weeks and the mortality rate. Also Pupelis et al. found that in patients with IAP higher than 25 mmHg had a significantly increased mortality up to 36%

Pupelis G, Austrums E, Snippe K, Berzins M. Clinical significance of increased intraabdominal pressure in severe acute pancreatitis. Acta Chirurgica Belgica 2002;102:71–74.

Measurement of intra-abdominal pressure



Intra-abdominal hypertension and abdominal compartment syndrome



Intra-abdominal hypertension (IAH) is defined as a sustained intra-abdominal pressure >12 mmHg. Abdominal compartment syndrome (ACS) is defined as a sustained intra-abdominal pressure >20 mmHg that is associated with new organ dysfunction.

Intra-abdominal hypertension is increasingly reported in patients with severe acute pancreatitis, and is caused by several factors, including visceral edema and ascites associated with massive fluid resuscitation, paralytic ileus and retroperitoneal inflammation. Several reports conclude that this phenomenon occurs within the first 5 days after admission.

Eur J Trauma Emerg Surg 2008;34:11–6
DOI 10.1007/s00068-008-7170-5

Although the typical symptoms of ACS, i.e. rapidly evolving multiple organ dysfunction syndrome (MODS) most often a combination of respiratory failure, hemodynamic compromise and acute renal failure) are often found in patients with severe acute Pancreatitis

IAH may also contribute to the development of pancreatic necrosis

Eur J Trauma Emerg Surg 2008;34:11–6
DOI 10.1007/s00068-008-7170-5

Systemic effects of elevated intra-abdominal pressure

Central nervous system
↑ Intracranial pressure
↓ Cerebral perfusion pressure
Cardiac
Hypovolemia
↓ Cardiac output
↓ Venous return
↑ PCWP and CVP
↑ SVR
Pulmonary
↑ Intrathoracic pressure
↑ Peak inspiratory pressure
↑ Airway pressures
↓ Compliance
↓ PaO_2
↑ $PaCO_2$
↑ Shunt fraction
↑ Vd/Vt

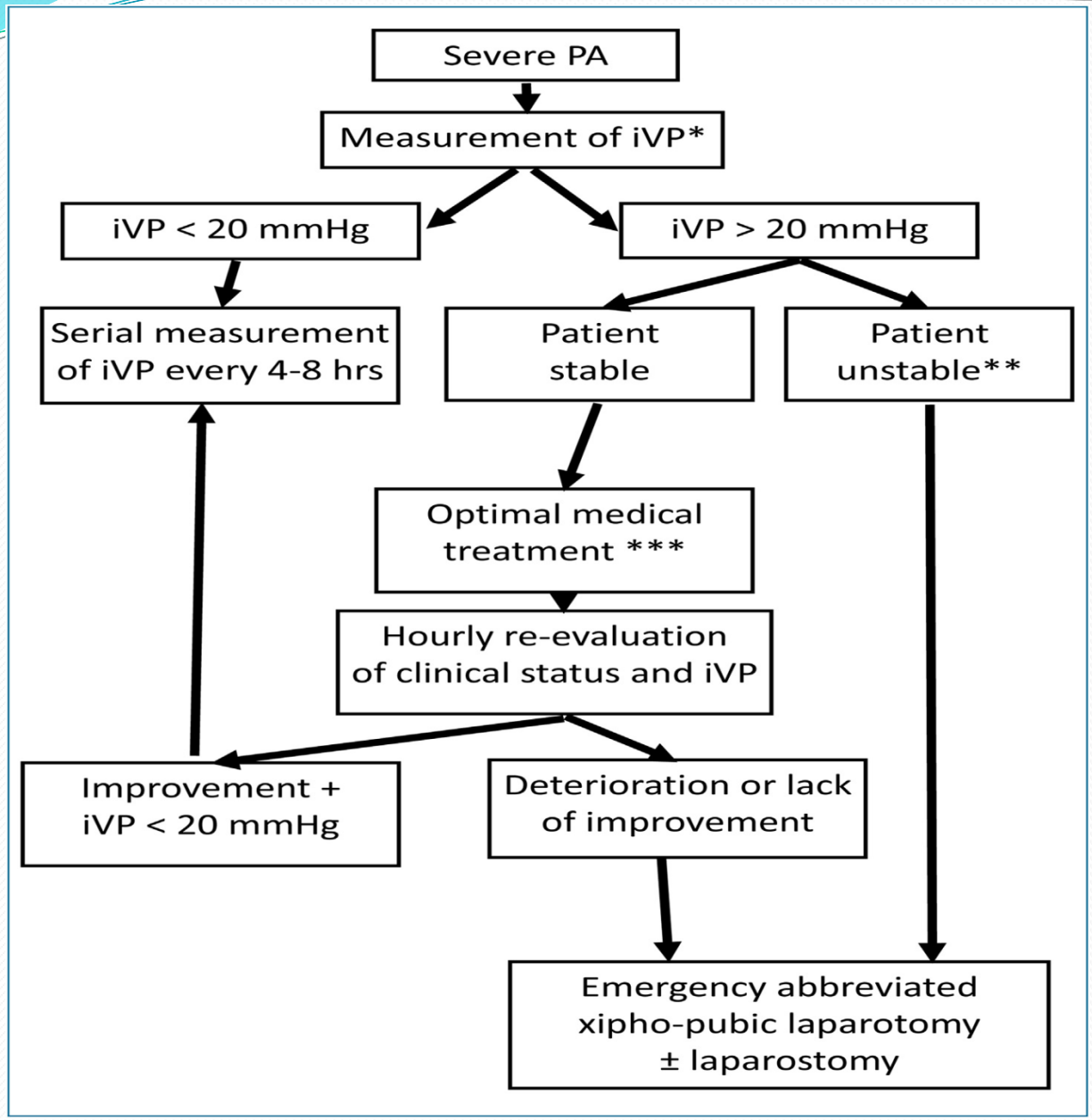
Gastrointestinal
↓ Celiac blood flow
↓ SMA blood flow
↓ Mucosal blood flow
↓ pHi
Renal
↓ Urinary output
↓ Renal blood flow
↓ GFR
Hepatic
↓ Portal blood flow
↓ Mitochondrial function
↓ Lactate clearance
Abdominal wall
↓ Compliance
↓ Rectus sheath blood flow

Graphic 70250 Version 3.0

The association between IAH and development of organ dysfunction in severe acute pancreatitis is well documented. De Waele et al. showed that there was a 95% incidence of respiratory failure, 91% cardiovascular and 86% acute renal failure rate in patients with IAP of 15 mmHg or higher

Decompressive laparotomy has been shown to effectively reduce IAP and reverse the symptoms typically associated with ACS but mortality is high

De Waele JJ, Hoste E, Blot SI, Decruyenaere J, Colardyn F. Intraabdominal
hypertension in patients with severe acute pancreatitis
Crit Care 2005;9:R452–7.



https://doi.org/10.1016/j.jviscsurg.2021.01.001
1878-7886/


Thank you