

Managing GI Issues in the Athlete

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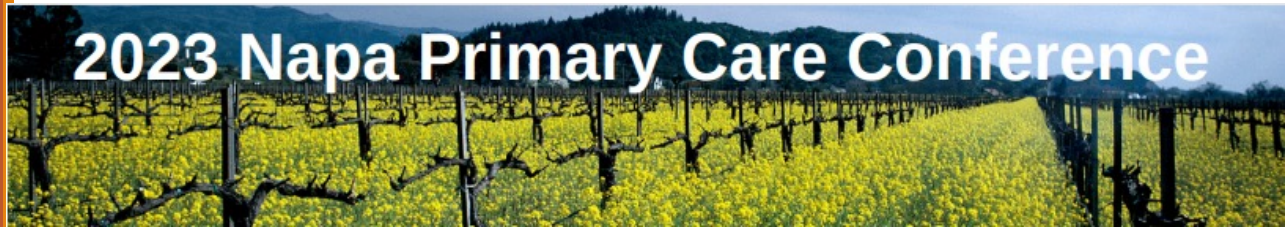
KAISER PERMANENTE SPORTS MEDICINE

NAPA 2023



Nothing to declare

2023 Napa Primary Care Conference





“More marathons are won or lost at the porta-toilets than the dinner table”
-Bill Rodgers



Objectives

Recognize and treat common GI disorders in athletes

Upper GI

- GERD/PUD/gastritis
- Nausea/vomiting
- Elevated LFTs

Lower GI

- ETAP
- Lower GIB
- Exercise associated diarrhea

What are the physiologic affects of exercise on the GI system?

Splanchnic blood flow shunts away from gut

- 80% during exercise with intensity > 70% of VO₂max

Decreased esophageal motility and gastric emptying but no changes in intestinal motility

- Manometry studies = reflux even without sx.

Myriad changes in gut hormonal milieu

- Increased permeability = no change in H₂O or CHO absorption
- No bacterial translocation
- Elevated endotoxemia not associated with GI sx?

Wright. Clin J Sport Med. 2011;21(4):337

van Wijck. PLoS One. 2011;6:e22366

Simon. Current Sports Medicine Reports. 3(2):112-6, 2004 Apr.

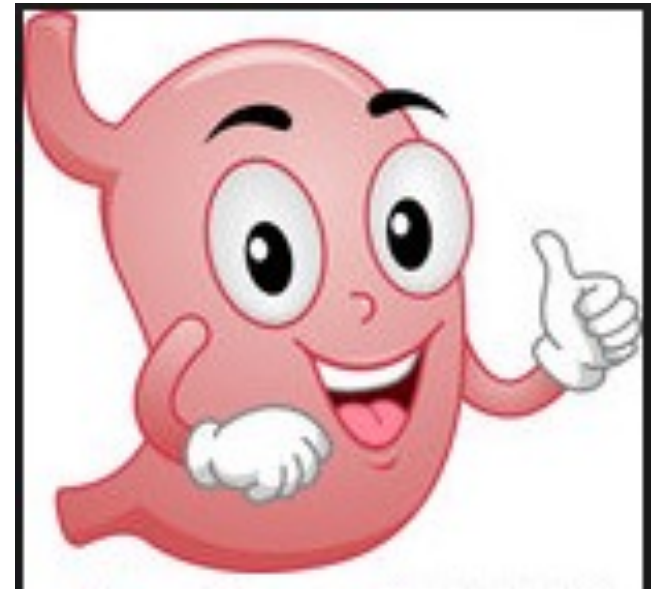
Are there GI benefits to Physical Activity?

Convincing evidence

- Reduced risk of Colorectal cancer

Probably helpful

- Diverticular disease
- Cholelithiasis
- Constipation
- IBS
- Non-alcoholic fatty liver disease



But for most people...

30-90% of athletes complain of GI symptoms

- higher in women and in younger athletes
- twice as common during running than other endurance sports, eg cycling or swimming
- 1.5-3.0 times higher in elite athletes than recreational exercisers.
- Common cause of non-finishing in ultra events

32% of Ironman participants report severe GI distress

Hoffman . *Int J Sports Physiol Perform.* 2011;6:25–37
Oliveira. *Sports Med* 2014; 44(Suppl 1): 79–85.
Pfeiffer. *Med Sci Sports Exerc.* 2012;44:344–351



Case #1

A 21-year-old male middle-distance runner with exercise-induced nausea and vomiting episodically after strenuous training, occurs 4–5 times a year on average, usually early in the season

- No significant PMH or PSH.
- No medications or supplements.
- normal physical examination.

Exertion-associated nausea

“you’re not working hard enough if you don’t puke!!”

Consumption of a meal within two to three hours of exercising

Dehydration

Pre-race analgesic use

Increase rate of breathing and “swallowing air”

- drinking from water “squirt” bottles
- carbonated beverages
- cycling position, particularly when in the ‘aero’ position.

intensity of exercise not consistently associated

Treatment with Oral Ondansetron for Ultramarathon-Associated Nausea: The TOO FUN Study

by  Andrew V. Pasternak ^{1,2,*} ,  David Fiore ² ,  Arthur Islas ² ,  Sarah Toti ³   and  Martin D. Hoffman ^{4,5}  

Double blind RCT

62 ultramarathon runners

4mg ondansetron vs placebo

No improvement in sxs

Pasternak, et al. Sports. 2021;9(3)

Case #2

26 yo professional basketball player developed acute onset epigastric pain and nausea immediately after practice Monday morning.

- VSS, afebrile
- Maybe some rebound tenderness
- KUB = ?free air

- Transferred to ED for further evaluation



Case #2: ED evaluation

Serum electrolytes normal

- hypoNa
- ARF
- Rhabdo
- Pheo (5% of presentation is N/V assoc with exercise)

LFTS = AST 50, ALT 43

RUQ US – normal

ECG - normal

Further history = alcohol and spicy food evening prior

Dx = GERD

Gastroesophageal Reflux Disease

Runners > cyclists

- Weightlifters have highest rate of reflux sx's

Proportional to intensity and duration

Worse with greater gastric contents

- Incidence 3x higher post-prandial

Prevention: No food for 3hrs prior to exercise

Medications

- Antacids (beware Mg containing = diarrhea),
- H2RB (anticholinergic = decreased sweating)
- PPI

Peptic Ulcer Disease

Several studies = no increase PUD in recreational athletes.

Physical activity = less PUD

- HR = 0.38 for > 10 mi/week
- due to increased immune function, decreased acidity, decreased stress?



Cheng Y. Br J Sports Med 2000;34:116-121

Are his elevated liver enzymes a concern?

Increased serum levels of AST, ALT, alk phos, creatine phosphatase, LDH have been observed.

- From liver or muscle?
- Transient and benign
- Ask about recent heat injury, exertional rhabdo, drug, alcohol, or supplement use
- FTI with 1-3 weeks of no exercise, consider further medical work up.

“I was vomiting black mucus and had a lot of black diarrhea.”

Derek Clayton after his world record marathon run in 1979



GI bleeding in runners

Lower GIB reported incidence from 7-85% depending on intensity/duration

- 80% FIT+, 20% hemeocult+ in marathon
- Endoscopy = watershed zones of cecum and splenic flexures

True anemia is rare – look for alternate causes of blood loss.

NSAID use in athletes common

GI bleeding in runners

Prophylactic PPI may prevent (H2RB do not)

- 20 ultra-marathoners, DB RCT with 3d of 20mg propanazole



Case #3

18yo female collegiate runner. Recurrent RUQ pain associated with intense exercise. Severe enough to cause her to discontinue. Resolves within 10-15 minutes of cessation. Has not improved with changes in diet or fitness.

Exercise-related Transient Abdominal Pain (ETAP) aka “the side stitch”



Who gets side stitches?

69% of runners, 75% swimmers, 32% cyclists reported ETAP.

Incidence in a given race = 17-27%

20% of recreational runners report having in the last year, occurring on 10-20% of their runs.

Who gets a side stitch?

77% of athletes < 20 get ETAP, only 40% > 40. (rare before age 10.)

Male = Female

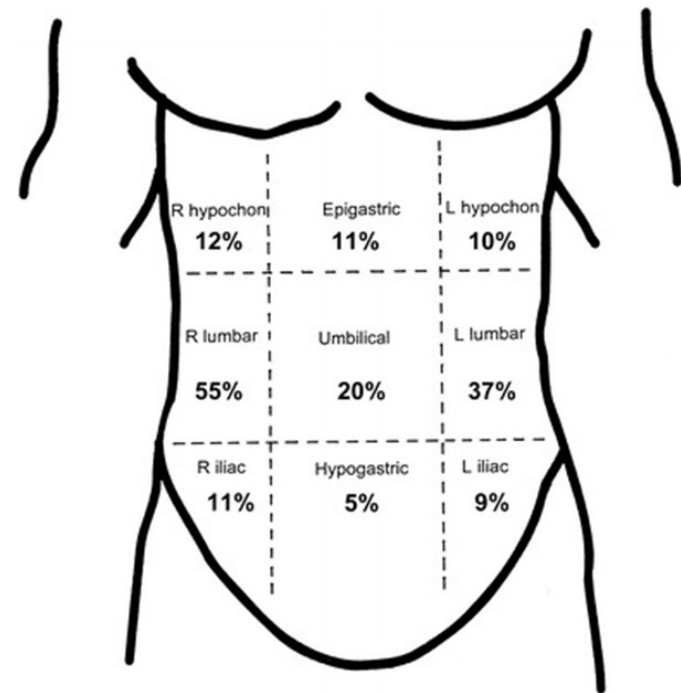
More common with repetitive torso motion, both vertical and rotation.

Intensity of activity not clearly correlated.

Kyphosis increases susceptibility but somatotype and BMI do not.

....what is a side stitch anyway?

- Reported in every location in the abdomen.
- May radiate to shoulder
- Poor reproducibility



Observations about ETAP

Pre-race meal

- Timing too close to exercise
- gastric volume and nutritional content do not seem to make a difference

Training decreases frequency but not incidence or severity

Conflicting evidence about warming up

- Can get stitches at any point in a race.

What causes a side stitch?

Strain on visceral ligaments

Diaphragm dysfunction/spasm

Thoracic spine somatic dysfunction

Intestinal ischemia

Peritoneal irritation

Contracting spleen or liver for autotransfusion

Shallow breathing



Morton. Sports Med 2015; 45:23-35

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Treating side stitches



side stitch treatment



All

Shopping

Images

News

Videos

More

Tools

About 9,100,000 results (0.50 seconds)

What can I do if I get a side stitch?

slow pace

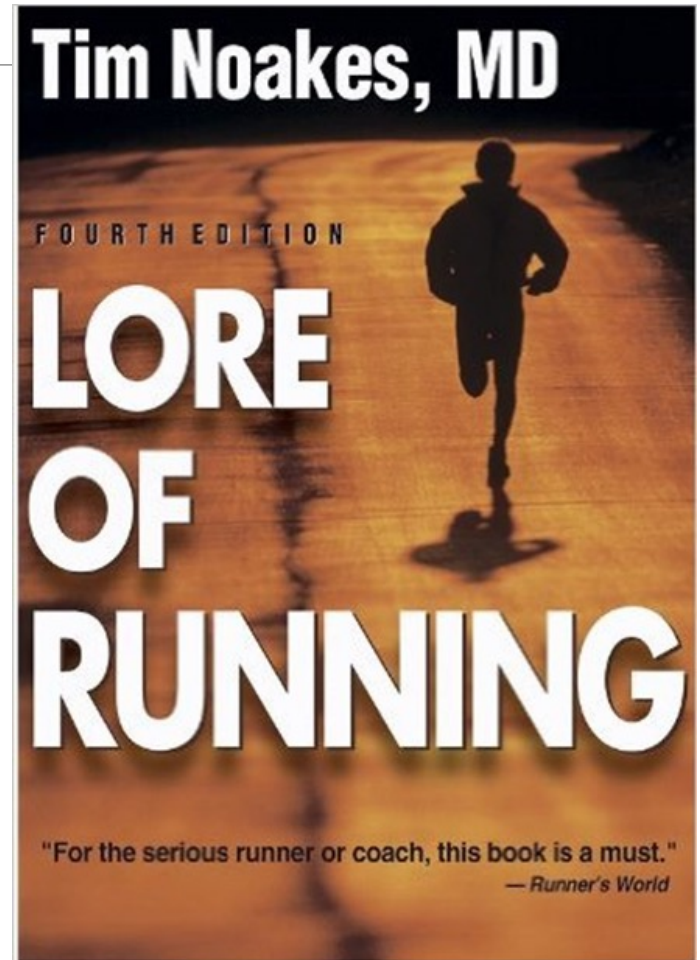
manual pressure on the abdomen
or bending at waist.

deep breathing with hands over
head (“through the stomach”).

- Raise ipsilateral arm over head,
exhale while rising up on toes

exhale when land on the left foot

- Inhale 3 steps, exhale on the 4th
(left foot)



Is there anything I can do to prevent getting side stitches?

Gradually increase intensity of work out

Improved posture/spinal alignment

- Pre-race side torso stretching.

Avoid high osmolarity/CHO drinks

Avoid eating 2-3 hours prior to exercise



Prevention of side stiches

“grow old”



Paul McCrory

(Br J Sports Med 2007;41:125)

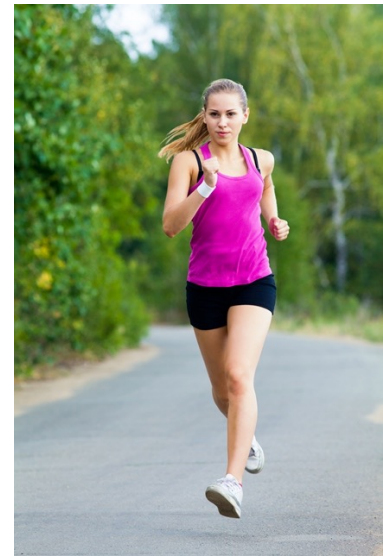
Case study

18yo female collegiate runner. Recurrent RUQ pain associated with intense exercise.

- Nothing but water 2hrs before
- No carbonated drinks
- Slower/longer warm up
- Work on breathing pattern

No improvement. Consistently impacting training

Now what?



When is it more than just a cramp?

Non-transient Symptoms

Pain out of proportion

- Appendicitis
- SBO
- Renal stone
- Splenic infarct (SCT)
- ischemic bowel (celiac artery stenosis)



When is it more than just a cramp?

cholelithiasis or biliary dyskinesia

- RUQ US
- HIDA scan

Slipped rib or other somatic dysfunction

- OMT

External compression

- median arcuate ligament syndrome
- supernumerary ligaments

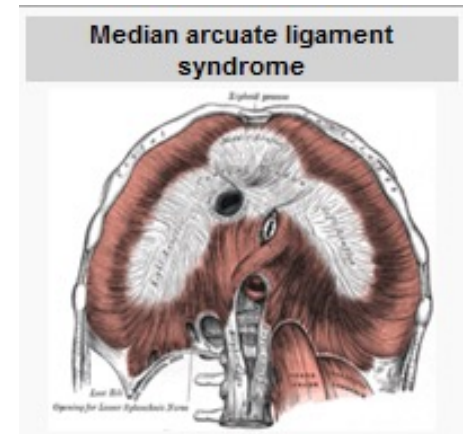
Median Arcuate Ligament Syndrome

Fibrous arch unites the crura of the diaphragm on either side of the aortic hiatus.

- congenitally low insertion can compress the celiac artery.
- Present in up to 30% of young people

Diagnosed with CT angio +/- tonometry (GET)

Case reports of resolution following resection



Arnaud
Demare
2011 Tour de
France



Exercise associated diarrhea

“runner’s trots”

60% of runners experience

- Up to 20% of marathon runners report seriously affected their training

No gender or age differences.

Improves with training.

Exercise associated diarrhea

Theories

- Fluid shifts
- Decreased splanchnic flow
- Dehydration
- Altered PARA and/or SYMPATHETIC tone
- Gut hormonal changes (esp gastrin and motilin)
- Mechanical (churning effect)
- Increased wall permeability = increased bacterial endotoxins = systemic effects
- Anxiety (pre-race anticipation)

How much does anxiety contribute to GI distress in athletes?

186 endurance athletes surveyed re stress and anxiety pre-race

higher anxiety was associated with nausea (OR = 5.57, 95% CI 1.96-15.83)

But not other GI sxs.

44 ultramarathon runners

1/3 of variation in GIS accounted for by higher pre-race anxiety

No gender difference



Wilson. J Sports Sci. 2018 Aug;36(15):1713-1719

Urwin. Sports Med Open. 2021 Dec 11;7(1):93

Further investigation is warranted if...

Chronic, persistent diarrhea

Melena or hematochezia

Significant change from prior pattern

Associated with persistent or severe abdominal pain

Fever

Personal or FHx of IBD



How clean is this water?

A large outbreak of gastrointestinal illness at an open-water swimming event in the River Thames, London.

attack rate 53% (338 cases).

Median incubation period 34 hours

median symptom duration 4 days

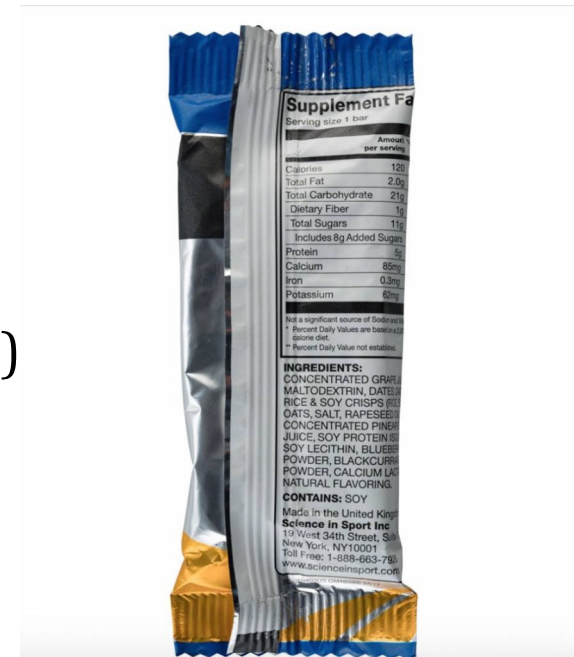
Nutritional causes of exercise associated diarrhea

Sugar alcohols can cause osmotic diarrhea.

- mannitol, sorbitol, and xylitol (least likely to cause diarrhea/gas)

Beverages with high osmolarities (>500 mOsm/L)

- Gatorade = 330 mOsm/kg
- Coca Cola = 493 mOsm/kg
- Red Bull = 605 mOsm/kg
- Fruit juice = 700-1100 mOsm/kg



Caffeine is a GI stimulant

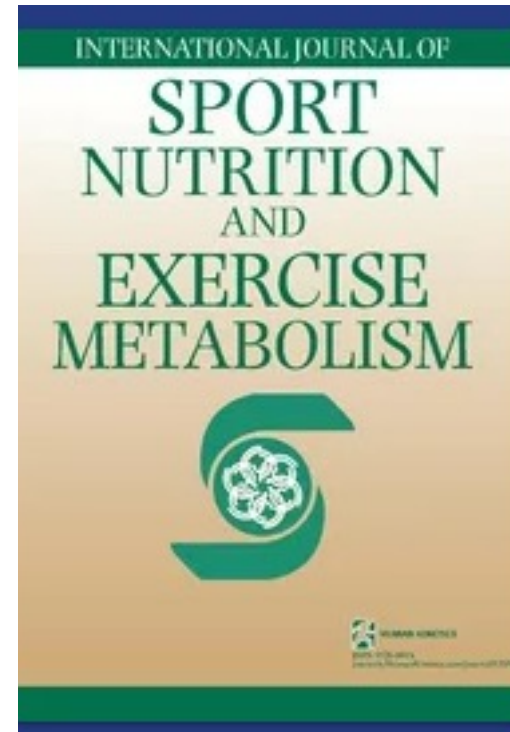
Does it matter how the CHO is delivered?

9 well trained triathletes

- Randomized cross-over trial comparing gel vs liquid
- 7/9 gel, 0/9 liquid
- No difference in performance

12 well trained cyclists

- Incidence of N, fullness, cramps
- Bars > gels > liquid



Sareban. Int J Sport Nutr Exerc Metab. 2016;26(2):114.

Guillochon. Int J Sport Nutr Exerc Metab. 2017;27(3):247

Single vs multiple combined CHO?

Fewer GI symptoms with formulations of multiple CHO, eg, glucose and fructose (2:1), compared with same volume of a single carbohydrate (glucose).



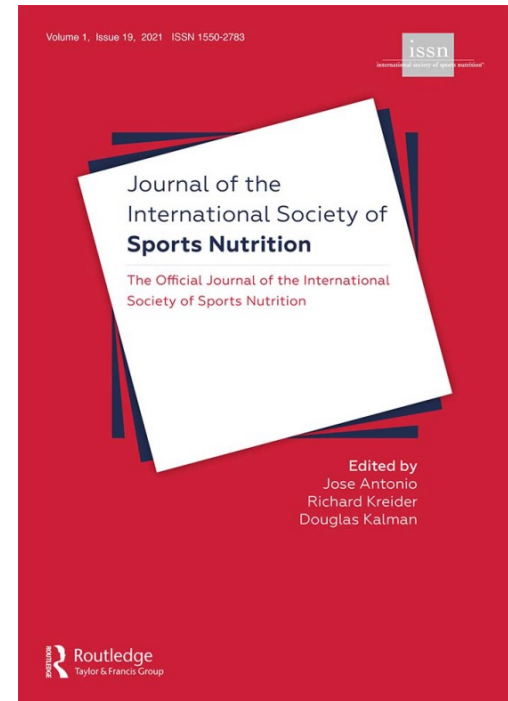
Rowlands. Med Sci Sports Exerc. 2017 Aug;49(8):1734-1744
Rowlands, Appl Physiol Nutr Metab. 2012;37:425-436.

Does a low FODMAP diet help prevent GI symptoms?

Most common sports nutrition products are high FODMAP

Sixteen healthy amateur athletes
randomized crossover design

Lower perceived GI sx in low FODMAP diet



Killian. *Front Nutr.* 2021;8:637160.
Wiffin. *J Int Soc Sports Nutr.* 2019;16(1):1

Preventing the “gingerbread man”

Avoid high fiber/fat day prior

Pre-race meal 2-3 hours prior

Avoid dehydration.

Pre-race loperamide ok

- No Lomotil (anti-chol)

Practice nutrition strategies

Fructose + Glucose (rather than either alone or sugar alcohols)

Avoid caffeine and high osmolality



Summary

GI symptoms in athletes are common and usually benign

Common things are common

- Lactose intolerance, etc
- Beware of anti-cholinergic effects of some OTC meds

Getting nutrition right can be trial and error but general rules

- Simple pre-race meal 2-3 hours prior
- Avoid high carbs, high osmolality
- Consider CHO type, blend, and source

Thank You

