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ABSTRACT & COMMENTARY

As-needed Inhaled Corticosteroid/LABA May Be Effective for Mild Asthma Control

By David Fiore, MD

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Dr. Fiore reports no financial relationships relevant to this field of study.

SYNOPSIS: In two randomized, double-blind, multicenter trials, symptom-triggered, twice-daily dosing of budesonide-formoterol was as effective in preventing severe asthma attacks as scheduled twice-daily dosing of budesonide-terbutaline, but not as effective in relieving symptoms.

SOURCES: O'Byrne PM, et al. Inhaled combined budesonide-formoterol as needed in mild asthma. *N Engl J Med* 2018;378:1865-1876.

Bateman ED, et al. As-needed budesonide-formoterol versus maintenance budesonide in mild asthma. *N Engl J Med* 2018;378:1877-1887.

Asthma is a disease with worldwide prevalence that affects approximately 300 million people and is increasing by 50% every decade.[1] The guidelines from the National Asthma Education and Prevention Program Expert Panel Report 3 (EPR-3) stress the importance of both symptom control and the prevention of severe exacerbations.[2] For mild persistent asthma, EPR-3 recommendations include a short-acting beta-agonist (SABA) and an inhaled corticosteroid (ICS) to both reduce symptoms and reduce the risk of a severe exacerbation. Although not incorporated into the guidelines, a 2013 Cochrane review demonstrated the safety (no increase in severe exacerbations) and benefit (decreased annual steroid dose) of intermittent vs. scheduled ICS use.[3] The two studies published in the May 17, 2018, issue of *The New England Journal of Medicine* concern whether using an ICS plus a long-acting beta-agonist (LABA) is as effective as continuous use of an ICS for reducing symptoms and exacerbations in patients with mild asthma.

In the Symbicort Given as Needed in Mild Asthma (SYGMA) 1 trial, O'Byrne et al performed a 52-week, double-blind, multicenter, randomized study in asthmatics > 12 years of age who experienced mild persistent asthma. A run-in period was used before randomization

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to ensure that patients met EPR-3 criteria for Step 2 treatment (SABA plus ICS). The three regimens assessed were twice-daily placebo plus terbutaline (0.5 mg) used as needed (terbutaline group), twice-daily placebo plus budesonide-formoterol (200 µg of budesonide and 6 µg of formoterol) used as needed (budesonide-formoterol group), or twice-daily budesonide (200 µg) plus terbutaline used as needed (budesonide maintenance group). A total of 3,836 patients were followed throughout the study. The amount of time (percent of weeks) that the asthma was well-controlled (the primary outcome) was highest in the budesonide maintenance group (44.4%) compared to the budesonide-formoterol group (34.4%) and the terbutaline group (31.1%). The rates of severe exacerbations were similar in both budesonide groups and lower compared to the terbutaline group (annual rate of 7% in the budesonide-formoterol group, 9% in the budesonide maintenance group, and 20% in the terbutaline group). The authors also found that the median metered daily dose of inhaled glucocorticoid in the budesonide-formoterol group (57 µg) was 17% of the dose in the budesonide maintenance group (340 µg). In the SYGMA 2 trial, Bateman et al used similar inclusion and exclusion criteria as well as a run-in period. The authors randomly assigned 4,215 patients to receive twice-daily placebo plus budesonide-formoterol (200 µg of budesonide and 6 µg of formoterol) used as needed or budesonide maintenance therapy with twice-daily budesonide (200 µg) plus terbutaline (0.5 mg) used as needed. The primary outcome was the annualized rate of severe exacerbations with symptom scores as secondary outcomes. The authors found that budesonide-formoterol used as needed was non-inferior to budesonide maintenance for preventing severe exacerbations but was not as successful in reducing symptoms. The total steroid dose was reduced 75%.

■ COMMENTARY

It is challenging to figure out how to use the results of these two studies, which suggest that as-needed budesonide-formoterol is not inferior to maintenance budesonide in preventing severe asthma exacerbations. However, the results also suggest that when it comes to symptom control, the as-needed combination is less effective than maintenance budesonide but more effective than terbutaline alone. These results are consistent with the findings of previous studies and a 2013 Cochrane review that also found the combination of budesonide-formoterol is effective when used intermittently as guided by symptoms.[4,5] Before delving into some of the strengths and limitations of these two studies, it is important to note that not only were these studies sponsored by AstraZeneca, the manufacturer of the medications used (some of which are still on patent), but also that trial data "were analyzed by employees of the sponsor, AstraZeneca" and that the sponsor was involved in all stages of manuscript preparation. I am concerned that the authors (and AstraZeneca) set up a straw man comparison by choosing to use terbutaline vs. formoterol when terbutaline has been shown to be inferior to formoterol for controlling asthma, probably due to its shorter half-life.[5] It must also be noted that although the as-needed regimen did not result in increased severe exacerbations, it did not give the same degree of relief from asthma symptoms as the scheduled dose of ICS. Some patients may accept this trade-off, while others may find the persistent symptoms troubling or bothersome. However, given these concerns, the studies were well-conducted and add to the body of literature that in mild asthmatics it is safe to use a controller agent such as an inhaled corticosteroid on an "intermittent" basis, expanding it to an as-needed basis for the ICS/LABA combination used here.

I have been telling my mild asthmatics that they should use their ICS for a week or so when they have a cold or allergies or any other reason they suspect their asthma may worsen. These studies add to this advice, with the ability to use a combination ICS/LABA as needed without worrying about increased severe exacerbations. ■

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ABSTRACT & COMMENTARY

After the WHI: How Is Your Sex Life?

By Jeffrey T. Jensen, MD, MPH

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Dr. Jensen reports he is a consultant for and receives grant/research support from Bayer, Merck, ContraMed, and FHI360; receives grant/research support from Abbvie, HRA Pharma, Medicines 360, and CONRAD; and is a consultant for the Population Council.

SYNOPSIS: Women who discontinued systemic postmenopausal hormonal therapy following participation in the Women's Health Initiative studies experienced an increase in vaginal and sexual symptoms.

SOURCE: Gass M, et al. Sexual activity and vaginal symptoms in the postintervention phase of the Women's Health Initiative Hormone Therapy Trials. *Menopause* 2018;25:252-264.

Although it is well-established that hormonal therapy (HT) improves symptoms of genital atrophy, the effect of postmenopausal HT on sexual function remains controversial. Gass et al analyzed data from the postintervention phase of the Women's Health Initiative (WHI) study to determine the effect of HT discontinuation on sexual function.

The authors of the WHI studies randomized 27,347 postmenopausal women 50-79 years of age to receive either combined hormonal therapy (daily oral conjugated equine estrogens [CEE], 0.625 mg plus oral 2.5 mg medroxyprogesterone acetate) or, if hysterectomized, estrogen-only (CEE, 0.625 mg) or placebo. Although the authors excluded women symptomatic with vasomotor symptoms, genital symptoms were not specified as exclusion criteria. All participants completed extensive questionnaires at baseline that included sexual history. Both studies were discontinued prematurely, and women received notification of their randomization group, breaking the blind. After this notification, subjects were invited to participate in a postintervention follow-up survey. Investigators added questions to these postintervention surveys regarding sexual function, which included seven key clinical characteristics of sexual activity: frequency of intercourse, discomfort with intercourse, desire, arousal, ability to climax, vaginal tightness, and satisfaction with sexual activity. The response options differed slightly between the estrogen-progestin therapy (EPT; compared current symptoms with symptoms while on treatment) and estrogen therapy (ET; asked about current symptom frequency only) studies.

A total of 13,902 women (9,450 in the EPT trial, 4,452 in the ET trial) responded to postintervention questionnaires, representing response rates of 93% and 90%, respectively. Ninety-two percent of responses to these surveys were received between eight and 13 months after each trial ended. There was no difference in the response rate or baseline characteristics between subjects randomized to active treatment or placebo. Overall, women with medical conditions (e.g., cancer, myocardial infarction, congestive heart failure, diabetes mellitus, hyperlipidemia, hypertension, arthritis, and depression) reported significantly lower levels of sexual activity than healthy women. Although the survey asked questions about sexual activity with and without a partner, about half the women reported no sexual activity since discontinuing HT, and the main explanation for this was lack of a partner. Sexual activity also declined with age, from 46% among women < 60 years of age to only 9% among women > 80 years of age.

The change in function following discontinuation of HT represents the primary results of interest. Here, we see a mixed effect. The prevalence of sexual activity postintervention was not significantly different between former EPT (36%) and placebo (34%; $P = 0.37$). However, women in the EPT study who had received active treatment during the intervention period were significantly more likely (20%) to report a decreased frequency of intercourse postintervention than the group formerly randomized to placebo (9%), and also more likely to report a decrease in desire (17% vs. 6%), arousal (17% vs. 7%), ability to climax (19% vs. 7%), and satisfaction with sexual activity (17% vs. 8%); an increase in tightness of vagina (12% vs. 3%); and discomfort with intercourse (15% vs. 3%). Sexual activity reported by former ET users following discontinuation was 5.6% higher than placebo users (27.6% vs. 22.0%; $P < 0.001$). Only two sexual function items yielded statistically significant differences by intervention arm in the ET trial: Women formerly assigned to placebo reported both desire and arousal to be "rarely" or "not at all" present more frequently than those who had discontinued active treatment.

These results suggest that changes in sexual function occur over time in postmenopausal women, with HT associated with modest protection that declines following discontinuation.

■ COMMENTARY

The WHI continues to provide opportunity for investigators seeking to understand the benefits and risks of HT. Although the large sample size and randomized design are enormous strengths, representation remains a major criticism of the study, as the population enrolled was asymptomatic and approximately 10 years postmenopausal — a decade older than the age at which women commonly start HT. The older age and exclusion of women with vasomotor symptoms affects generalizability to healthy younger menopausal women. The exclusion of women with vasomotor symptoms also likely excluded many women with comorbid symptoms of vulvovaginal atrophy. This conclusion is reinforced by supplemental material presented by Gass et al; only 13% of sexually active women in the original WHI population reported vaginal dryness at enrollment.

Can we learn anything from studying the sexual health of this population following discontinuation of HT? After notification of randomization that "broke the blind," was this effectively turning the WHI into a cohort study? A fundamental weakness is that the researchers asked subjects to recall sexual outcomes while on treatment (or placebo) and compared these to postintervention status. We know that HT improved vaginal dryness after one year of treatment, decreasing to 8% among women assigned to HT while staying essentially the same among women randomized to placebo (12%). We also see a postintervention climb back to baseline (14%) among those formerly assigned to HT but a decrease to 8% among those who received placebo. Although this supports a rapid reversal of the treatment effect of HT, we can't ignore the fact that unblinding occurred. The decrease among placebo users suggests that women find other means of accommodating dryness over time, perhaps through the use of lubricants. The authors of another recently published study suggested that lubricants work just as well as vaginal estrogen, but the length of treatment and dose of estrogen may not have made this a fair comparison.[1] An alternative hypothesis is that some women simply avoid sex, for myriad reasons. While the proportion of women reporting sex with a partner postintervention did not differ between women randomized to active treatment and placebo in the EPT study, when the question was asked differently in the ET study (e.g., over the past three months), significantly fewer former placebo users (37% vs. 44%) reported having had sex. Also, as noted above, women in the EPT group reported a significant decrease in the frequency of sex with a partner postintervention. The study did not provide any comparison of absolute frequency between the groups. Other studies have shown that intercourse frequency may be driven by male partners and is not associated with satisfying sex for women. Although flawed, this postintervention follow-up study provides limited insight into the effects of discontinuation of HT on sexual symptoms. In the early 2000s, I saw a busy referral practice of women with vulvodynia and sexual pain disorders. Following the publicity of the initial findings of the WHI, I noticed a steep increase in new complaints of dyspareunia and a return of symptoms in many women with prior successful treatments for vulvar dermatoses. Many cases were associated with discontinuation of HT. Although several local hormonal and nonhormonal options will improve vulvovaginal symptoms, for many women the convenience of systemic HT will make sense, particularly when bone protection is considered. As clinicians, we must bring sexual health into the conversation around menopausal HT. ■

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ABSTRACT & COMMENTARY

Fish Consumption and Disease Activity in Rheumatoid Arthritis

By Allison Becker, ND, LAc

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Dr. Becker reports no financial relationships relevant to this field of study.

SYNOPSIS: A cross-sectional analysis using baseline data from participants in the Evaluation of Subclinical Cardiovascular Disease and Predictors of Events in Rheumatoid Arthritis (ESCAPE-RA) cohort study demonstrated biweekly consumption of fish significantly decreased pain and progression of RA sufferers.

SOURCE: Tedeschi SK, et al. Relationship between fish consumption and disease activity in rheumatoid arthritis. *Arthritis Care Res (Hoboken)* 2018;70:327-332.

Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by synovial inflammation leading to pain, functional impairment, and joint erosions. Disease-modifying anti-rheumatic drugs (DMARDs) are the standard of care and significantly decrease inflammation, improve symptoms, and decrease erosions. Omega-3 fatty acids decrease pro-inflammatory cytokines and have been studied in the form of orally dosed fish oil in several randomized, controlled studies.[1,2] In double-blind, placebo-controlled studies, subjects ingesting fish oil experienced reduced pain in joints and higher rates of remission on DMARD therapy.[3,4] Since the benefits of eating fish had not been studied in relationship to reducing RA signs and symptoms, Tedeschi et al sought to investigate the benefits of eating fish for those with RA.

A total of 176 participants in the Evaluation of Subclinical Cardiovascular Disease and Predictors of Events in Rheumatoid Arthritis (ESCAPE-RA) study were included in this analysis. The majority were middle-aged, college-educated, white females taking DMARDs for seropositive, long-standing RA. These participants were enrolled in the ESCAPE-RA study from October 2004 to May 2006, were 45 to 84 years of age, and lived near Baltimore. Subjects with a previous cardiovascular event or weighing > 300 pounds were excluded. In this study, baseline signs and symptoms were evaluated using the Disease Activity Score in 28 joints (DAS28) and C-reactive protein (CRP). The DAS28 includes examination of the joints for swelling and tenderness in 28 joints, global scores of pain and overall status, and questionnaires to assess function (HAQ). The median DAS28-CRP score at baseline was 3.5 (interquartile range, 2.9-4.3), reflecting moderate disease activity. A DAS28-CRP of > 5.1 implies active disease, < 3.2 low disease activity, and < 2.6 remission. Dietary intake was measured using a baseline food frequency questionnaire assessing usual diet in the past year. Fish consumption was recorded in four categories: never to < 1 time/month, 1 time/month to < 1 time/week, 1 time per week, and ≥ 2 times per week. Fish included in the study were tuna, salmon, sardines, and "other broiled, steamed, baked, or raw fish (trout, sole, halibut, poke, grouper, etc.)." These fish were selected because of higher omega-3 content. Excluded were fried fish, non-fried shellfish, or fish mixed into dishes. The serving size was not recorded, as these data focused on frequency of consumption rather than quantity. Future studies could investigate serving size of fish and specific types of fish consumed and their individual effect on DAS-CRP.

Confounding variables in this study include age, gender, body mass index, depression, marital status, DMARD therapy, and fish oil use. A linear regression model adjusted to these variables was used to test the relationship between frequency of fish consumption and DAS-CRP. After adjusting for these confounders, subjects consuming fish more than two times per week had a significantly lower DAS28-CRP compared to subjects who ate fish never to less than one time per month (difference, -0.49; 95% confidence interval [CI], -0.97 to -0.02). To test for trends across categories of fish consumption, the authors calculated the difference in DAS28-CRP associated with increasing fish consumption (an increase of one serving per week). For each additional serving of fish per week, DAS28-CRP declined significantly by 0.18 (95% CI, -0.35 to -0.004).

■ COMMENTARY

Epidemiological data have shown the related benefits of eating fish and decreased cardiovascular mortality, decreased rates of diabetes, lower rates of depression, and decreased risk of dementia.[5-8] To date, much research has been conducted on the benefits of supplementing with omega-3 rich fish oil. A recent randomized, controlled trial of fish oil supplementation among patients with RA included those with disease duration of 12 months taking triple DMARD therapy. Subjects were divided into two categories: treatment with high-dose fish oil (eicosapentaenoic acid [EPA] + docosahexaenoic acid [DHA], 5.5 g/day) and treatment with low-dose fish oil (EPA and DHA, 0.4 g/day). There was no significant difference between the groups in the DAS28-ESR over 12 months. However, at 12 months, both groups had significant decrease in DAS28-ESR.

Using this analysis, we can start to see a greater benefit with eating fish instead of simply supplementing with fish oil. Those in the highest fish consumption group (more than twice per week) consumed < 5.5 g EPA + DHA per day. A 1 ounce serving of fatty fish provides 2 to 4 g of EPA and DHA.[9] Whole fish provides many additional micronutrients and macronutrients that may account for the additional beneficial effect. Oily fish are good sources of vitamin B12, vitamin D, vitamin A, selenium, zinc, iodine, iron, potassium, and calcium. Seeing the added value of fish compared to fish oil, future studies could explore the benefit of these other nutrients in RA. However, one drawback to eating fish is the increased intake of mercury and PCBs present in fish. Fish oil often is purified to remove such contaminants. These contaminants may interfere with the anti-inflammatory effect of the omega-3s present in the fish. Future studies comparing therapeutic effectiveness of fish low in mercury and PCB contaminants with those that are higher also could yield useful information. Ideally, clinicians want patients to adopt healthy, low-inflammatory lifestyles. In patients who live a more inflammatory lifestyle (i.e., smoking), there still is a benefit in eating oily fish regularly. Foods high in omega-3s produce a direct anti-inflammatory effect and can offset the negative effects of a high inflammatory, standard American lifestyle. Interestingly, pack years were highest and depression scores were lowest among those who ate fish more than two times per week. It is impressive to note in smokers with a high inflammatory state that there is a significant benefit from eating fish. It also is important to note that consuming fish may

have the additional beneficial effect on mood. Healthier mood encourages greater motivation for self-care and healthier lifestyle choices. Encouraging consuming oily fish on a regular basis is wise clinical advice. The greatest anti-inflammatory benefit comes from eating oily fish at least twice per week. However, it is important to be especially careful with this recommendation for pregnant women and young children. In the most recent recommendation from the Environmental Protection Agency,[10] pregnant women and women who intend to become pregnant should consume only lower mercury-containing fish and a maximum of three servings per week. It is also recommended children eat fish once or twice per week, choosing lower-mercury fish. These include shrimp, pollock, salmon, canned light tuna, tilapia, catfish, and cod. The omega-3s in fish are very important for the development of a healthy nervous system, but the mercury in some fish is neurotoxic. The seven types of fish with higher levels of mercury that should be avoided include tilefish from the Gulf of Mexico, shark, swordfish, orange roughy, bigeye tuna, marlin, and king mackerel. One should consider the environmental effect of more people eating fish on a regular basis. Some fish are severely over harvested and are at risk of becoming endangered. Seafood Watch (www.seafoodwatch.org) is a good resource for patients to learn which fish are safe to consume and which fish are sustainably harvested. ■

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PHARMACOLOGY UPDATE

Amlodipine and Celecoxib Tablets (Consensi)

By William Elliott, MD, FACP, and James Chan, PharmD, PhD

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Dr. Chan is Associate Clinical Professor, School of Pharmacy, University of California, San Francisco.

Drs. Elliott and Chan report no financial relationships relevant to this field of study.

The FDA has approved a single tablet combination of amlodipine (AML) and celecoxib (CEL) for use in patients with hypertension and osteoarthritis. AML is a calcium channel blocker, and CEL is a selective cyclooxygenase inhibitor nonsteroidal anti-inflammatory drug (NSAID) marketed since 1992 and 2006, respectively. The combination is marketed as Consensi.

INDICATION

AML/CEL is indicated for patients for whom the treatment with AML for hypertension and CEL for osteoarthritis is appropriate.[1]

DOSAGE

The recommended starting dose is 2.5 mg of AML and 200 mg of CEL taken once daily.[1] The AML dose can be titrated to 5 mg or 10 mg daily. AML/CEL is available as a single tablet combination of 2.5 mg/200 mg, 5 mg/200 mg, and 10 mg/200 mg tablets.

POTENTIAL ADVANTAGES

AML/CEL provides a convenient single-tablet treatment in appropriate patients.

POTENTIAL DISADVANTAGES

AML/CEL carries a boxed warning for risk of serious cardiovascular and gastrointestinal events associated with NSAIDs.[1]

COMMENTS

The approval of the combination AML/CEL was based on a randomized, double-blind, placebo- and

active-controlled study in 152 subjects with newly diagnosed hypertension.[1] Subjects were randomized to four treatment arms, 10 mg AML + 200 mg CEL, 10 mg AML, 200 mg CEL, or placebo (no AML or CEL). The results showed that the combination provided similar blood pressure reduction to the same dose of AML alone. There are no studies on the AML/CEL combination regarding reducing the signs and symptoms of osteoarthritis, so effectiveness of CEL in the combination is inferred from placebo-controlled studies of CEL alone.

CLINICAL IMPLICATIONS

AML/CEL is an interesting fixed combination. It combines two drugs that exhibit different treatment paradigms, a chronically administered drug and one in which the lowest dose and shortest duration of treatment may be appropriate based on individual treatment goals. Intermittent dosing of acetaminophen and over-the-counter NSAIDs are the initial recommended pharmacologic treatments by the American College of Rheumatology, after nonpharmacologic modalities, for both osteoarthritis of the knee and hip.[2] This is followed by full-dose acetaminophen. If there is inadequate response, oral NSAIDs may be considered in patients < 75 years of age and without contraindications. In a recent Cochrane analysis, the authors found no clear evidence of differences between CEL and other NSAIDs in reducing pain and improving physical function in osteoarthritis, although they cited data quality issues due to pharmaceutical industry involvement and limited data.[3] In patients with established cardiovascular disease or an increased risk of the development of cardiovascular disease, CEL appears to pose no greater risk than ibuprofen or naproxen.[4] However, the risk of gastrointestinal toxicity was lower with CEL compared to ibuprofen and naproxen. This "protective" effect decreases in patients taking low-dose aspirin for cardioprotective effect, in which case a concomitant proton pump inhibitor is recommended. Oral NSAIDs should not be used in patients with stage IV or V chronic kidney disease and should be used with caution in patients with stage III chronic kidney disease.[2] Given these considerations, the applicability of the single-tablet AML/CEL appears to be quite limited. The cost for AML/CEL is not available at the time of this review. ■

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CME QUESTIONS

1. **Which statement about as-needed use of budesonide/formoterol is true?**
   a. As-needed use of budesonide/formoterol is as effective as fixed-dose use of budesonide for preventing severe exacerbations.
   b. As-needed use of budesonide/formoterol is as effective as fixed-dose use of budesonide for preventing symptoms of asthma.
   c. Both a and b are true.
   d. Neither a nor b is true.

2. **In the WHI postintervention survey of sexual health, compared to participants formerly randomized to placebo, those who had received active therapy reported which of the following?**
   a. An increase in the frequency of vaginal dryness symptoms
   b. An improvement in libido and orgasm
   c. Greater overall sexual satisfaction
   d. An increase in sexual frequency with a partner

3. **Which of the following statements is true about fish consumption and rheumatoid arthritis (RA)?**
   a. Subjects with RA had an equal reduction in symptoms and signs of RA with supplemental fish oil when compared to eating whole fish.
   b. Subjects with RA had no change in DAS28 C-reactive protein when eating whole fish.
   c. Subjects with RA who ate oily fish twice per week saw a significant reduction in joint pain, joint swelling, and C-reactive protein.
   d. Smokers with RA did not see any improvement in DAS28 C-reactive protein from consuming whole fish.

Internal Medicine [ALERT]

ECG Review

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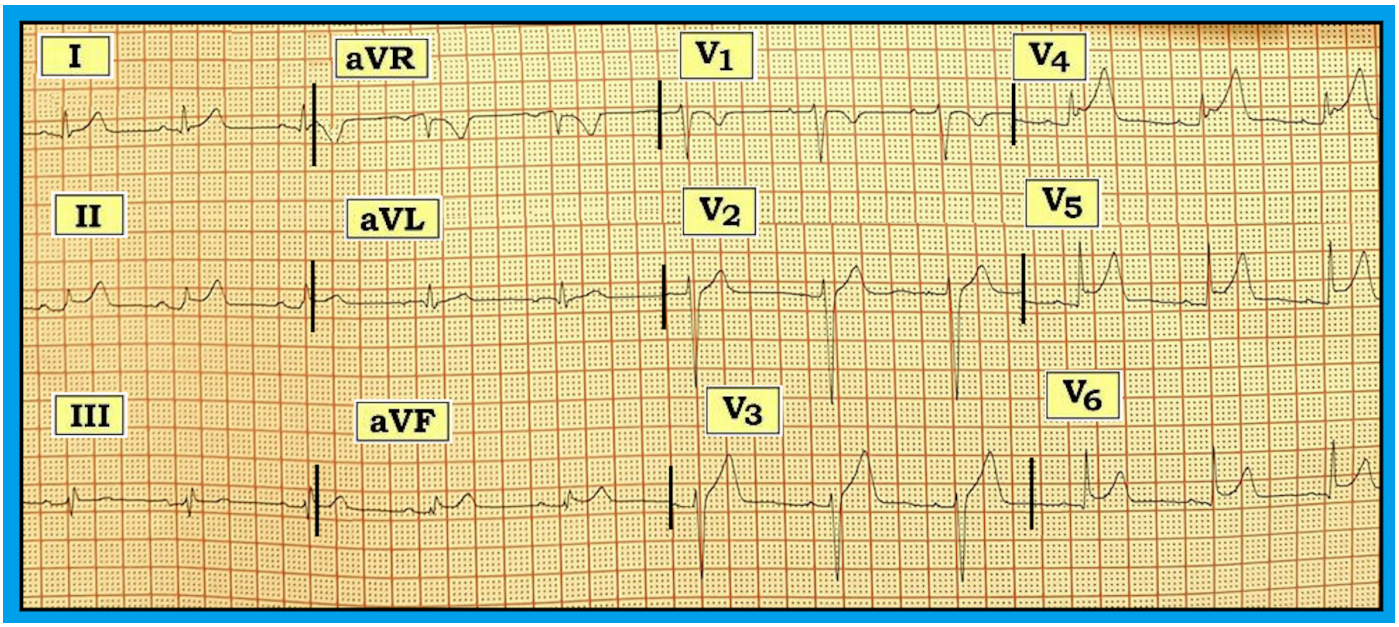
Dr. Grauer reports no financial relationships relevant to this field of study.

An Uncommon Cause of ST Elevation?

A previously healthy 19-year-old man presented to the ED following a syncopal episode. His initial ECG is shown in the figure below. Are the ST-T wave abnormalities seen in this tracing the result of early repolarization? Or is this likely to represent acute pericarditis? A CT angiogram was performed while the patient was in the ED. It was normal. Does this alter your diagnostic considerations?



We interpret the ECG in the figure as showing sinus arrhythmia (normal intervals and axis), low voltage in the limb leads, and no chamber enlargement. An rSr' complex is present in lead III. Tiny Q waves are seen in leads I, aVL, V5, and V6. R wave progression is normal, with transition occurring between leads V3 to V4. The tracing is remarkable for its ST-T wave changes. T waves are markedly peaked in multiple leads. Additionally, multiple leads show upward-sloping (i.e., "smiley" configuration) ST segment elevation. There is no reciprocal ST depression.

ST segment elevation in multiple leads with T wave peaking as seen here should bring to mind several diagnostic considerations. These include acute pericarditis, hyperkalemia, ST segment elevation myocardial infarction (i.e., an acute STEMI), a repolarization variant, or acute myocarditis. Or is it something else?

The normal CT angiogram plus initial laboratory work ruled out the possibility of the above entities. Serum potassium was normal. Acute pericarditis usually does not present with syncope, and T waves clearly are more peaked in this tracing than usually are seen with acute pericarditis. Acute infarction would seem unlikely given the normal CT angiogram, the lack of chest pain in the history, and the lack of reciprocal ST depression on ECG. The history also does not suggest acute myocarditis. Finally, the amount of ST elevation and the degree of T wave peaking seen here clearly are more marked than generally is seen with a simple repolarization variant.

Cardiac catheterization revealed clean coronary arteries and a myocardial bridge in the mid-portion of the left anterior descending coronary artery. While not a common cause of acute cardiac symptoms, it is important to be aware of the possibility of myocardial bridging, especially when symptoms arise in a younger adult not expected to have coronary disease. The diagnosis in this case would have been missed had cardiac catheterization not been performed.

For more information about and further discussion on this case, please visit: https://bit.ly/2t58fjI.