

letters

Insulin pump therapy during Ramadan fasting in type 1 diabetic adolescents

To the Editor: Since the introduction of continuous subcutaneous insulin infusion (CSII) in the late 1970s, it has become apparent that the use of insulin pump therapy has many potential benefits for children and adolescents with type 1 diabetes. It improves glycemic control, reduces hypoglycemia and decreases episodes of recurrent diabetic ketoacidosis (DKA).¹⁻³ Fasting during Ramadan has been uniformly discouraged by the medical profession for children and adolescents with type 1 diabetes, especially those with brittle, poorly controlled diabetes.⁴ Insulin pump therapy may help in controlling blood glucose during fasting. Continuous insulin infusion can be modified and adjusted instantaneously to avoid hypoglycemia and breaking the fast. To our knowledge, this is the first study that describes the use of insulin pump therapy in adolescents with type 1 diabetes and shows its efficacy and safety during Ramadan fasting.

CSII was initiated in 5 Saudi adolescents with type 1 diabetes mellitus through insulin pump therapy between October 2003 and June 2005. All patients were followed at The Pediatric Endocrinology Clinic at The Specialized Medical Center Hospital, Riyadh, Saudi Arabia. These adolescents showed interest in fasting during the Holy month of Ramadan in the *Hijri* year of 1427 (between 23 September and 23 October 2006). The patients were trained on insulin pump programming and carbohydrate counting and started on continuous basal insulin infusion in addition to meals and insulin boluses for high blood-glucose correction. The results of blood glu-

ucose levels and the rate of hypoglycemic episodes were compared with those in 4 adolescents with type 1 diabetes who were on conventional insulin (CI) therapy. CI therapy is defined as two insulin injections per day, before breakfast and before dinner combining the intermediate-acting insulin (NPH) and the short-acting insulin (regular). The patients on CI therapy were trained on the exchange program for diet therapy and also showed interest in fasting during Ramadan. All patients visited the clinic prior to the month of Ramadan to adjust insulin doses and they were instructed to check blood glucose more frequently, especially during the fasting hours. The recommended times for blood glucose check-up were pre-sunset meal, 2 hours after, pre-dawn meal, 2 hours after, pre-school, after school and as needed.

The patients included in the study had type 1 diabetes mellitus for a mean duration of 7 years (range, 5 to 9 years). The age of the adolescents ranged from 15 to 19 years. They were followed on insulin pump therapy for a mean duration of 18 months. There was a significant reduction in HbA_{1c}, mean blood glucose level and the frequency of hypoglycemic episodes in adolescents on insulin pump therapy in comparison to CI therapy during Ramadan fasting. The mean HbA_{1c} was 7.8% (range, 7.1-8.9%) in the insulin pump group compared to 9.1% (range, 8.3-10.6%) in the CI group ($P < .001$). The mean blood glucose was 123 mg/dL (range, 72-201 mg/dL) in the insulin pump group compared to 192 mg/dL (range, 122-394 mg/dL) in the CI group ($P < .001$). The mean frequency of simple hypoglycemia (defined as blood glucose < 60 mg/dL) was 16 episodes (range, 12-29) per patient per month in comparison to 29 episodes (range, 19-36) per patient per

month in the CI group ($P < .002$). None of the patients developed severe hypoglycemia (defined as hypoglycemia associated with coma or convulsion) or DKA during Ramadan fasting. One month prior to Ramadan, the mean frequency of simple hypoglycemia in the insulin pump group was 11 episodes per patient per month and the mean frequency of simple hypoglycemia in the CI group was 18 episodes ($P < .001$). Three adolescents on CI therapy had to break their fast during Ramadan once or twice because of hypoglycemia. However, none of the insulin pump group broke their fast. All adolescents on insulin pump therapy had to adjust their basal rate insulin infusion to avoid hypoglycemia prior to Ramadan fasting. Ten to 15% of the basal insulin infusion rate was reduced during the hours of fasting. One patient on insulin pump therapy suspended the pump for 2 hours to avoid hypoglycemia. The pre-dawn insulin dose was reduced 10% to 20% in the CI group. The total insulin dose requirement was 0.9 units/kg/day (range, 0.8-1.2) in insulin pump group in comparison to 1.1 units/kg/day (1.0-1.3) in the CI group. One unit of the ultra-short acting insulin lispro (Humalog) was required to cover for 10 grams of carbohydrates and one unit of lispro insulin was required to cover for 50 to 100 mg/dL of blood glucose above 100 mg/dL as a correction bolus for high blood levels.

Several reports indicated that fasting in Ramadan is safe for the majority of diabetic patients with proper education and diabetes management.⁴ Most type 2 diabetics can fast safely during Ramadan. Occasionally, patients with type 1 diabetes who insist on fasting during Ramadan can also fast if they are carefully managed. In this study, the frequency of hypoglycemia was significantly lower in the CSII group.

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The ability to lower the basal insulin infusion rate in insulin pump or even suspend it helped diabetics to avoid major hypoglycemic attacks during fasting. Patients were able to continue fasting till dawn by controlling and adjusting the basal rate. None of insulin pumpers broke their fast during Ramadan in comparison to the adolescents on CI therapy who once or twice broke their fast. Eating during the period of fasting in Ramadan may have a negative psychological effect on patients especially during the adolescence period. Adolescents may feel embarrassed to eat or drink and break their fast although they feel hypoglycemic. Insulin pump therapy helped these adolescents to feel more satisfied and confident.

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Vertebroplasty in osteoporosis-related vertebral fractures

To the Editor: I read with great interest the brief report by Dr. Nizar Al-Nakshabandi entitled "Percutaneous vertebroplasty in patients with osteoporotic verte-

bral body fractures."¹ Certain issues need to stand corrected. The author's assertion that "there are no well established pain management protocols" is untrue. If this is the indication for vertebroplasty then it is incorrect to do the procedure. The author has failed to mention anywhere in the article the indications for vertebroplasty in general and the indications in their patients. It is important to make clear that the prime indication of vertebroplasty is failure of conservative treatment of osteoporosis² or vertebral fractures refractory to medical therapy.³

Osteoporosis particularly in postmenopausal women is a growing problem in Saudi Arabia and it appears it will grow further with the aging of population.^{4,5} The author discussed the study of El-Desouki et al⁶ which appeared to be out of context as it does not indicate any prevalence of osteoporosis related vertebral fractures. The reported prevalence of osteoporosis-related vertebral fractures in the Saudi society was 18.2% and none of these patients were treated by vertebroplasty.⁷

It is unfortunate that the author failed to mention in the conclusion that vertebroplasty is not a procedure to be taken lightly and has its own complications and needs to be done at regional centers where such procedures are done on a regular basis.

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Reply

In response to Dr. Sadat-Ali, the comment, the "lack of well established pain management protocols" was the conclusion of Kaemmerlen et al in the *New England Journal of Medicine*,¹ and is not my assertion. The indications for vertebroplasty in general and in our patients were mentioned and include pain relief, stabilization, destructive metastases, extensive bone lysis in multiple myeloma, and weakened vertebra in the vertebral body.² Although failure of conservative therapy is an indication for vertebroplasty in chronic back pain secondary to osteoporotic fractures, there is growing evidence that the use of this procedure in the acute setting is more beneficial.³⁻⁵ The focus of this study was not to shed light on osteoporosis, which has been done many times, even by Dr. Sadat-Ali himself, but rather to shed light on a solution to a problem of great magnitude in the region.

Finally I am surprised at Dr. Sadat-Ali's comment that "the procedure needs to be done at regional centers where such procedures are done on a regular basis." The author received training and board certification, including a hands-on fellowship in image-guided musculoskeletal

interventions. The procedure is done on regular basis with a team approach and has been widely accepted by referring physicians and patients alike.

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Off-pump beating coronary artery bypass grafting in a young adult with Kawasaki disease

To the Editor: Atherosclerosis is a well-known cause of coronary artery disease (CAD). Risk factors, including hypertension, hyperlipidemia and hyperglycemia, are well established. Kawasaki disease is a risk factor for the development of coronary artery aneurysm and stenosis in most infants and children but surgical revascularization for coronary artery lesions caused by Kawasaki disease has been rarely reported in adult patients. Kawasaki disease plays an important role in ischemic heart disease in adults without coronary risk factors. We encountered a young adult male with Kawasaki disease who underwent off-pump beating coronary artery bypass grafting (OPB-CABG).

A 35-year-old man with a his-

tory of mucocutaneous lymph node syndrome (Kawasaki disease) in childhood presented with chest tightness accompanied with shortness of breath for 6 months. He had no family history of atherosclerotic disease or associated risk factors such as smoking, hypertension and hyperlipidemia. There were no abnormalities in the physical examination or laboratory data. An electrocardiogram showed ST-segment depression and T wave inversion in leads V5 and V6. Treadmill-exercise testing revealed a high probability of CAD. The transthoracic echocardiography showed hypokinesia to akinesia of the proximal inferior wall and an estimated ejection fraction of 43%. Coronary angiography showed ectasia of the left main and diffuse ectasia of the left anterior descending artery (LADA) with proximal to distal diffuse segmental eccentric stenosis estimated to be about 50% to 60%. Angiography also showed a 95% discrete eccentric stenosis at the ostium of the first diagonal branch (Figures 1, 2) and diffuse ectasia at the proximal portion of the circumflex coronary artery with total occlusion at the middle portion (Figure 3) and diffuse ectasia at the proximal portion of the right coronary artery with total occlusion at the middle portion (Figure 4). CAD with a three-vessel aneurysm component was diagnosed, which is the appearance typically seen in Kawasaki disease. Percutaneous transluminal coronary angioplasty (PTCA) failed for the right coronary artery and left circumflex artery lesions. The patient underwent surgical revascularization by OPB-CABG with four-vessels grafts: left internal mammary artery to LADA, greater saphenous grafting vein to the secondary diagonal branch, distal left circumflex coronary artery, and secondary obtuse marginal. The postoperative course was uneventful

and he had no further cardiac events at 2 years follow-up.

Kawasaki disease is a syndrome that involves the skin, mouth, and lymph nodes. The outcome varies from complete recovery to fatal complications of coronary artery involvement.¹ Development of aneurysms and occlusive lesions in Kawasaki disease, particularly in children, have been well documented.² By spontaneous regression of coronary complications in Kawasaki disease, adult ischemic heart disease secondary to Kawasaki disease is uncommon. In adults, CAD is usually related to multiple predisposing factors, such as hyperlipidemia, cigarette smoking, diabetes mellitus, hypertension, strong family history, and others. However, in the absence of such risk factors, Kawasaki disease should be considered a cause of coronary artery lesions. In pediatric Kawasaki disease patients with coronary artery occlusive disease, anti-angina drugs and coronary angioplasty are often used as effective treatment.³ For PTCA failure or multiple coronary artery stenosis cases, CABG using arterial grafts can provide good results in long-term clinical follow-up.⁴ Kato reported 9 of 21 adult patients with a definite or suspected history of Kawasaki disease who underwent CABG and there are other case reports.⁵⁻⁸ In a review, clinical symptoms were described as acute myocardial infarction (MI) or previous MI or angina pectoris and the patients received conservative medical treatment, angioplasty, or surgical intervention in the form of CABG.⁹ Good results were reported for the CABG group while medication or PTCA has failed. Thus, CABG may be preferable in adult patients with Kawasaki disease as well as in adults with atherosclerotic ischemic heart disease. OPB-CABG is as effective as traditional CABG in the CAD patient.¹⁰ We adopted the off-pump



Figure 1. Coronary angiography showing severe coronary artery disease with several aneurysms and stenoses (arrow).

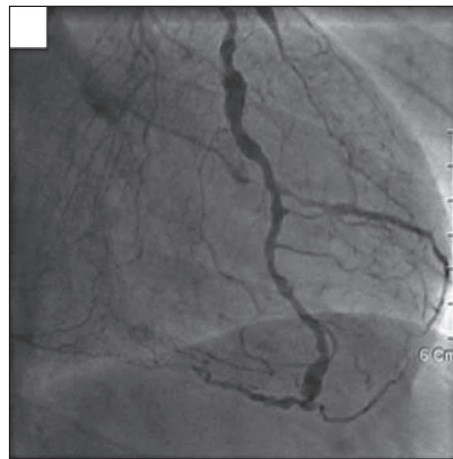


Figure 2. Aneurysmal left anterior descending artery and 95% ostium stenosis of the first diagonal branch.

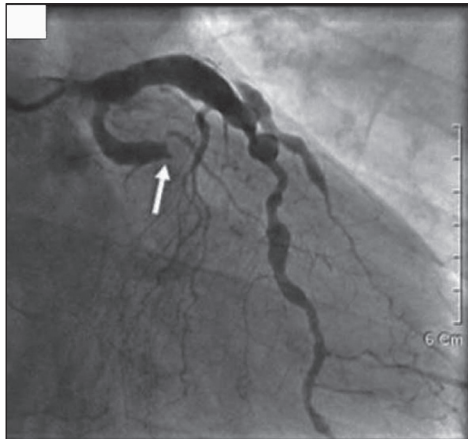


Figure 3. Proximal ectasia and total occlusion of the middle portion of the circumflex coronary artery (arrow).

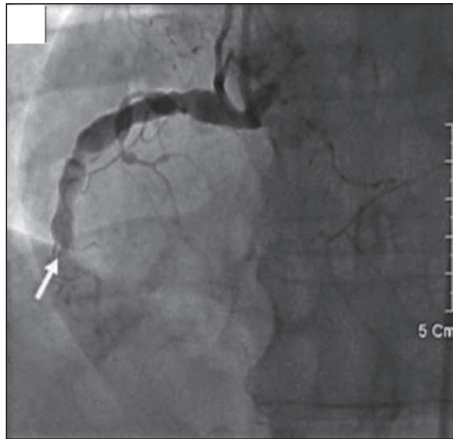


Figure 4. Proximal ectasia and total occlusion of the middle portion of the right coronary artery (arrow).

beating technique for multiple arterial grafts and successfully treated our CAD adult patient with Kawasaki disease. Long-term follow-up is necessary to compare the new technique and traditional CABG.

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