

15th International Conference on ALTERNATIVE MEDICINE &
12th World Congress on ENDOCRINOLOGY AND METABOLIC DISORDERS
December 09-10, 2019 Bangkok, Thailand

Clinical Image: Eversense sensor and transmitter - An interesting radiological images seen on plain X-rays of upper arms

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Case Presentation: A 43-year-old woman presents to discuss continuous glucose monitor (CGM) technologies. She has type 1 diabetes mellitus diagnosed at age 14 and has been on insulin pump since 2001 which was upgraded to Medtronic™ 630G in July 2017. She has adequate glycemic control (A1c 7.3%), but finger-stick blood glucose levels fluctuate widely with occasional hypoglycemia. Past surgical history was noncontributory. She exercises regularly, walking 30 minutes several times per day with a goal of 7000 steps per day. She tried to use a CGM in 2018 (Medtronic) but she discontinued the CGM due to frequent alarms. Patient reports the alarms were not due to highs or lows, but due to difficulty with obtaining accurate readings. Patient consulted an endocrine clinic to improve blood glucose monitor with new CGM technology. Patient subsequently developed bilateral arm pain intermittently for which primary care provider ordered X-ray of both arms which shows the Eversense™ sensor and transmitter on the right arm and the sensor alone on the left arm (Fig 1-2) CGM devices measure the glucose level of interstitial fluid which correlate well with plasma glucose. Glucose levels are measured every 5-15 minutes, depending on the device. The Eversense™ sensor (Fig 1-2) is placed in the upper arm by a physician. Once inserted, it continuously measures glucose levels for up to 3 months. The Eversense™ smart transmitter sits over the sensor on the upper arm. The transmitter is water-resistant, rechargeable, and can be easily removed. Not only can the transmitter can send data to the Eversense™ Mobile App but it can also provide on-body vibration alerts when glucose level fluctuates high or low. The Eversense™ Mobile App receives and displays the data easy-to-read charts and graphs, making it easy for patients to monitor their blood glucose. The difference between Eversense™ CGM system compared to other CGM devices are that (a) there is no weekly sensor self-insertion since Eversense™ CGM lasts up to 3 months, (b) sensor is placed under the skin; thus, no concern about it falling off, (c) no separate receiver is required; data, trends and alerts can be viewed on mobile device; (d) highs and lows can be detected quickly. Many CGM devices allow patients to share their blood glucose data in real time with friends, relatives, and caregivers using a smartphone app, which may be particularly important when patients have hypoglycemia. The case demonstrates an interesting radiological finding of an implantable CGM sensor, and also the importance of awareness of various CGM systems with different safety advantages to improve diabetic care.

Biography

Hoang's early experiences in Vietnam and his health-related work throughout the years have cultivated virtues of compassion, commitment and understanding, which provide him with a strong foundation for a career in Internal Medicine. Hoang earned his Bachelor of Science degree in Biochemistry and graduated with cum laude from the University of Maryland, College Park. He received his medical degree from Lake Erie College of Osteopathic Medicine in 2004 and completed his internship and residency training at the National Naval Medical Center (NNMC), Bethesda, Maryland in 2007. Hoang had served as a staff internist at the U.S. Naval Hospital Yokosuka, Japan from 2007-2009 and received a Teacher of the Year award 2008-2009. Dr Hoang completed his fellowship training at NNMC and is board certified in endocrinology, diabetes and metabolism. He served as a staff endocrinologist at National Naval Medical Center (2011-2012) and at Naval Medical Center Portsmouth (2012-2013). He served as Service Chief, Endocrinology and Metabolism Division and Diabetes Champion at the Naval Medical Center San Diego (2013-2016) and Associate Professor in medicine, Uniformed Services University of the Health Sciences. He is a Fellow of the American College of Physicians and the American College of Endocrinology. He has authored a variety of publications, including peer-reviewed articles, letter to the editor, and book chapters. He was recognized as "Associate Master Clinician Award" (2014) from Naval Medical Center San Diego. He came back to Walter Reed National Medical Center, Bethesda in November 2016 to join the Endocrinology clinic here and to serve as the National Capital Consortium Endocrinology Fellowship Program Director.

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