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Case Report

Bradycardia After Severe Weight Loss: Case Presentations

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Abstract

We report three young adult patients who developed marked sinus bradycardia (30–44 bpm) following pronounced weight reduction achieved either via strict dietary restriction or bariatric surgery (gastric banding and sleeve gastrectomy). Two were entirely asymptomatic and one had exertional fatigue with reassuring implantable loop recorder monitoring; all responded well without permanent pacemaker implantation.

Case presentations:

Case 1.

We present a case of a 28-year-old male with remote history of weight reduction who initially referred to electrophysiology (EP) clinic for episodes of light-headedness and fatigability for the past two months. His symptoms would appear at any time during the day, occasionally triggered by exertion. Physical examination during the episode revealed regular heart rate (HR) of 36 beat per minute (BMP), blood pressure of 110/60 mmHg. His physical examination otherwise unremarkable. He denied any family history of cardiovascular disorder. He denied smoking, consumption of alcohol neither illicit drugs abuse. Patient is not on any medications that could lower the heart rate. Further history revealed significant weight loss after an extensive dietary regimen restriction for the past two year in which his body mass index (BMI) improved from 48.9 to 29.1.

Investigations

The patient electrocardiogram (ECG) showed sinus bradycardia (Figure 1) and a 48hours Holter monitoring failed to document any significant pauses or heart block with sinus bradycardia on morning hours (Figure 2). Echocardiogram showed normal ejection fraction. Exercise ECG shows normal chronotropic response. Metabolic profile, thyroid profile and cortisol levels were within normal ranges.

Treatment

Patient was reassured and given multivitamins and minerals and Buscopan (anti cholinergic) tablets. Three months later his heart rate was improved with some improvements of his symptoms. However, patient was still complaining from easy fatigability, resting lightheadedness. , Implantable loop recorder (ILR) implanted for symptom-rhythm correlation and during the follow up he reported 12 symptomatic episodes during which ILR interrogation showed normal cardiac rhythm and rate during all reported symptoms (Figure 3). So we concluded that his symptoms can be explained by an increased resting vagal tone and reduced resting oxygen demand after excessive weight loss. The condition is considered to be benign, has good long-term prognosis and does not require pacemaker placement. He was reassured advised to regain some weight after which his heart rate and symptoms were improved

(Figure 1):12 leads surface ECG with sinus bradycardia .

(Figure 2): Bradycardia episodes on 24 Hours Holter with significantly reduced heart rate ranging from 28-30 beats

per minute.

(Figure 3): ILR interrogation within first month with at least 12 symptomatic episodes reported by the patient A) Quick look summary showing normal heart rate , B) ILR Tracing snapshot during the document symptoms showing normal HR ruling out the bradycardia as the cause of the patient symptoms.

Case 2.

A 43-year-old male who referred to the Cardiac EP clinic after discarded by anesthesiology pre-operation evaluation for hemorrhiodectomy operation due to sinus bradycardia with a heart rate of 40-44 BPM. Patient was completely asymptomatic. Physical examination revealed regular heart rate of 40/min, blood pressure of 100/70. He denied any family history of cardiovascular disorder. He denied smoking, alcohol consumption or use of illicit drugs. He denied taking any medication which would affect heart rate. His medical history included past morbid obesity, BMI of 42. Patient lost 35 kg in eight months after gastric banding surgery. The patient ECG showed sinus bradycardia, (Figure 4), 48 hours ambulatory ECG monitoring didn't show any significant pauses or heart block. Echocardiogram showed normal ejection fraction with normal structural heart. Metabolic profile and thyroid profile were within normal ranges. Patient was reassured and no medication was given since he was asymptomatic. Patient was cleared with low risk for heamorrhoidectomy which was done safely and uneventfully.

Figure 4: 12-lead surface ECG 8months post Bariatric surgery

Case 3

A 44-year-old male with no known past medical history of note apart from history of sleeve gastrectomy two years prior to his presentation was referred to our EP clinic because of bradycardia that discovered accidently during routine checkup. The patient lost about 60 kg after the mentioned surgery and remained totally asymptomatic afterwards. His physical examination was unremarkable with a heart rate ranging between 36 to 40 BPM. Laboratory workup were all normal including thyroid function test. His ECG showed sinus bradycardia (figure 5) and echocardiogram was normal. Patient performed a treadmill test in which his heart rate responded appropriately to the exercise (no chronotropic incompetence). Ambulatory ECG monitoring revealed no blocks with maximum HR 165 BPM a minimum HR 30 BPM. The average HR was 56 BPM. Patient was diagnosed with sinus bradycardia post severe weight loss. The patient was treated conservatively. Figure 5 : ECG is showing sinus bradycardia

Discussion

Obesity has been associated with increase in incidence of coronary artery disease, hypertension and metabolic syndrome, which all lead to increase in morbidity and mortality. Bariatric surgery is offered as a treatment for morbid obesity and has shown favorable outcomes in terms of reduction in cardiovascular events and all-cause mortality. (2) The number of patients undergoing weight reduction procedures is increasing. Our three cases are pointing to the possible correlation between the severe Weight loss and bradycardia as a physiological effect of severe weigh loss on the heart .

Increased obesity results from an increase in the size and number of adipocytes, which are the key physiological players in immunity and inflammation and thus implicated atherosclerosis. They are known to release cellular mediators known as "adipokines" such as leptin, adiponectin, and resisting. (5,6) Leptin is mainly produced by white adipose tissue and exhibits effects in nearly every organ system. Cardiac myocytes express several isoforms of the receptor.(7) It have been reported that obese populations have high amounts of adipokines, cellular mediators released by adipocytes, which are known to have adverse effects on the cardiovascular system. Leptin is one of the main adiponectin, and its role with associated tachycardia is well established. Obese patients with high leptin levels have significantly higher HR.(8) After weight loss the concentration of leptin decreases and leads to a decrease in HR. The drop in leptin level is proportional to the reduction in BMI, which could explain the association of magnitude in the drop in BMI and development of sinus bradycardia. (9) The significant decrease in Leptin levels can persists for up to two years after surgery.(10) Weight reduction has been shown to reduce sympathetic stimulation and augment parasympathetic drive resulting in increasing resting cardiac vagal tone. The combination of these effects is believed

to contribute to development of sinus bradycardia in post significant weight reduction. Sinus bradycardia is generally asymptomatic and does not require treatment. Even when it produces symptoms, as seen in our first patient It can be easily managed with parasymatholytics and does not require pacing. There has been a clear positive correlation found between heart rate and body mass index On the other hand the bradycrdia has no correlation with the mode of Weight reduction i.e. surgical or by strict diet regimen or in case of anorexia nervosa as reported in some cases (4).

Conclusion:

Bradycardia secondary to significant weight reduction irrespective to the mode of reduction is proved to be a benign condition which does not required pacing therapy. Most of the cases either were asymptomatic or responded well to anti-cholinergic medications. Health care provider should be aware of the risk of bradycardia post weight reduction. Bariatric surgeons have to inform their patient before surgery about such benign consequence after surgery in order not to get worried if they face this condition

Abbreviations:

Beat per minute :BMP

Body mass index :BMI

Electrocardiogram :ECG

Electrophysiology: EP

Heart rate :HR

Implantable loop recorder: ILR

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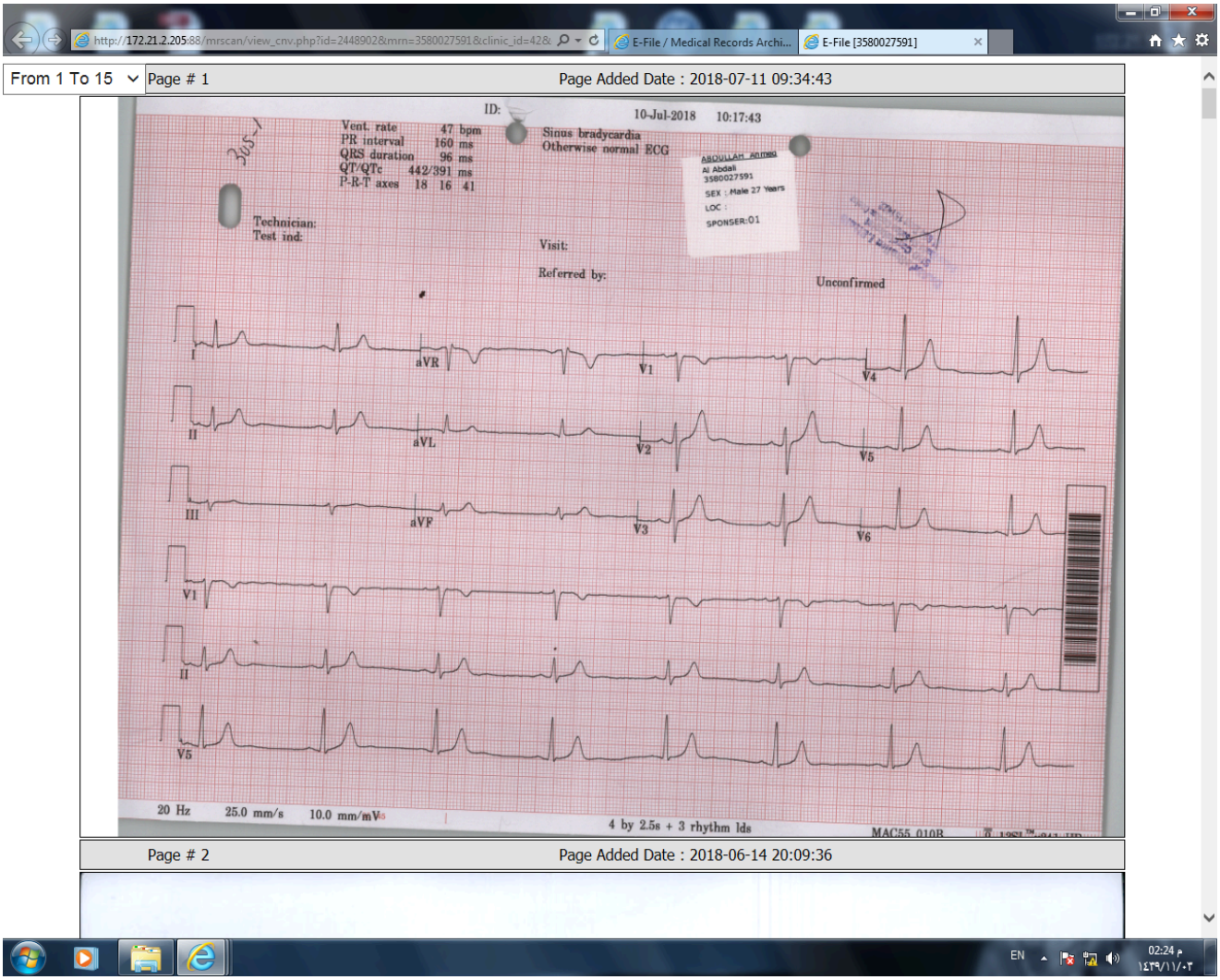


Figure 1: Case 1 — 12-Lead Surface ECG Showing Sinus Bradycardia

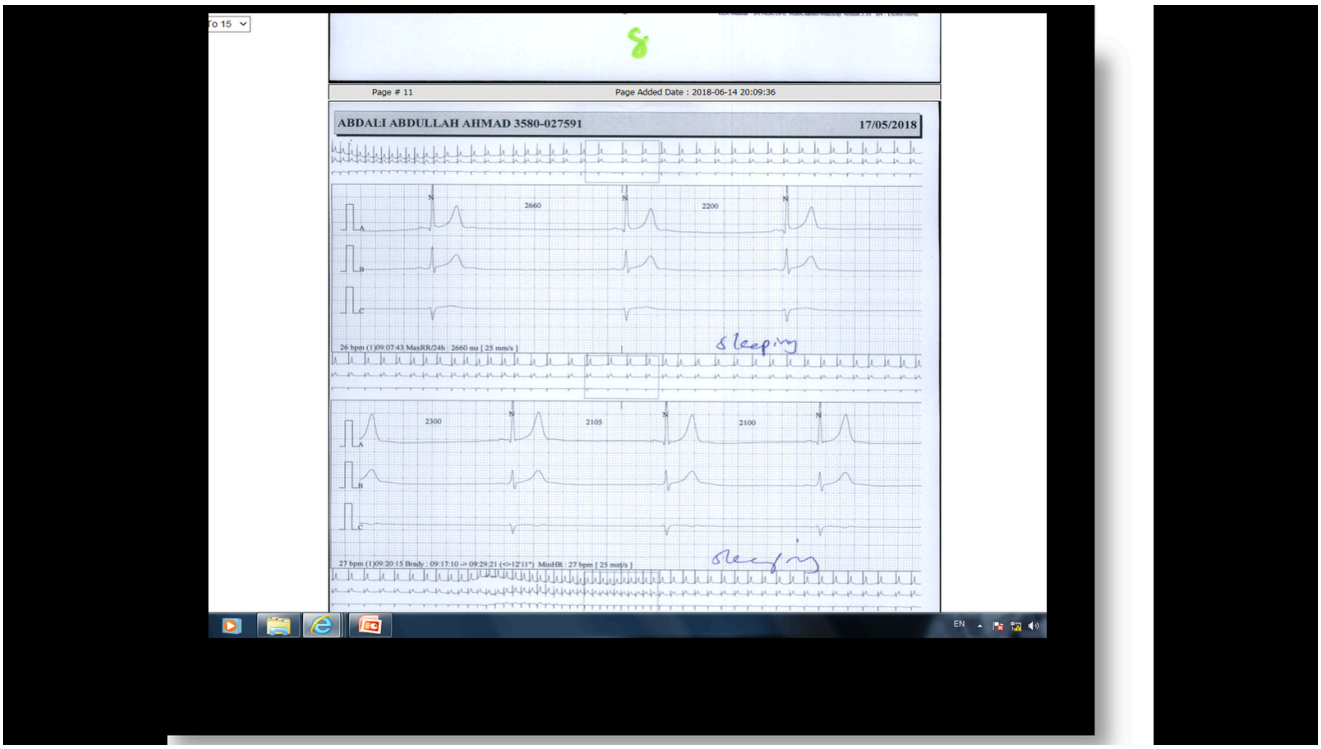


Figure 2: Case 1 — 24-Hour Holter Monitoring (Heart Rate 28–30 bpm)

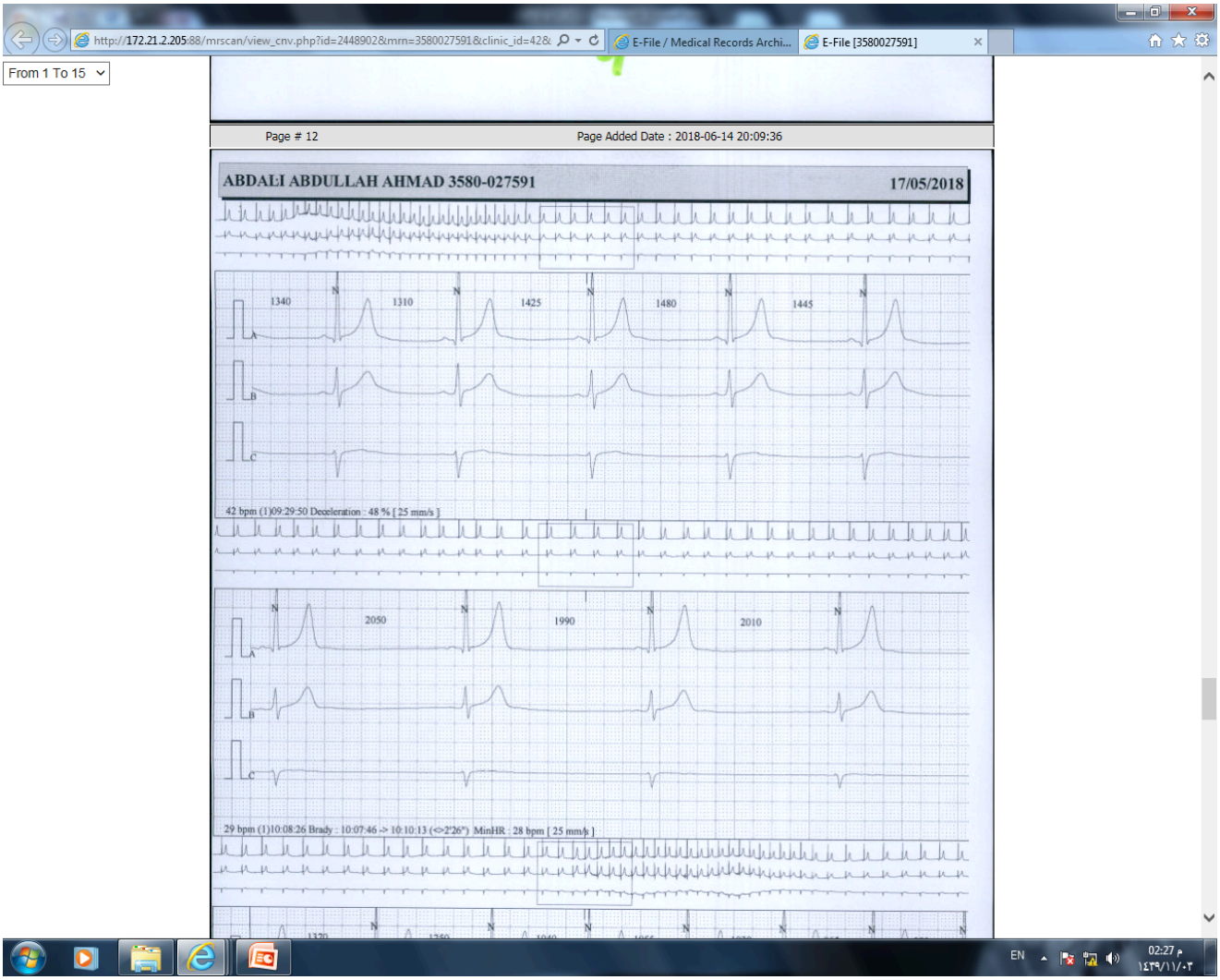
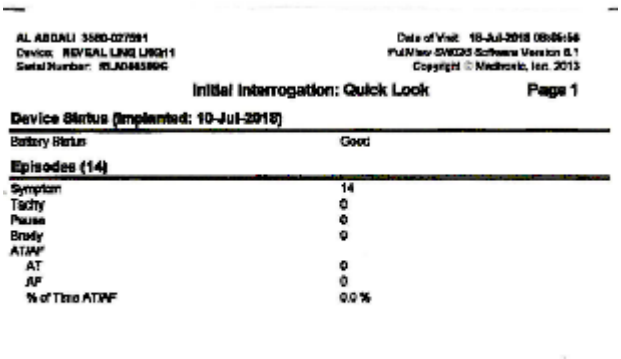


Figure 3: Case 1 — ILR Interrogation Summary & Symptom Tracing



AL ABDALI 3580-027591
Device: REVEAL LINQ LINQ11
Serial Number: [illegible]

Date of Visit: 18-Jul-2018 08:06:56
MyLNew SW026 Software Version 8.1
Copyright © Medtronic, Inc. 2013

Initial Interrogation: Quick Look **Page 1**

Device Status (Implanted: 10-Jul-2018)

Battery Status	Good

Episodes (14)

Symptom	14
Tachy	0
Pause	0
Brady	0
AT/AF	
AT	0
AF	0
% of Time AT/AF	0.0 %

Figure 4: Case 1 — Additional Electrophysiology Tracing

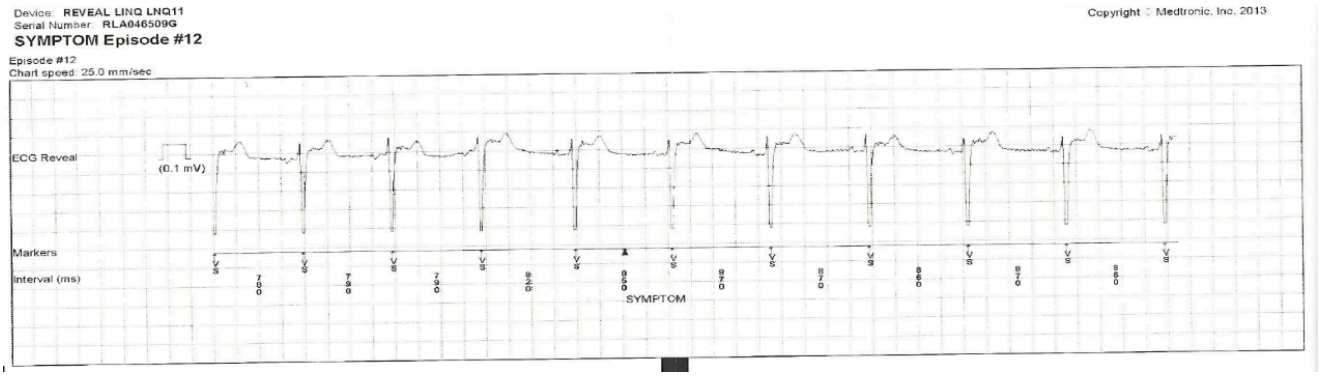


Figure 5: Case 2 — Pre-Operative 12-Lead ECG 8 Months Post Bariatric Surgery

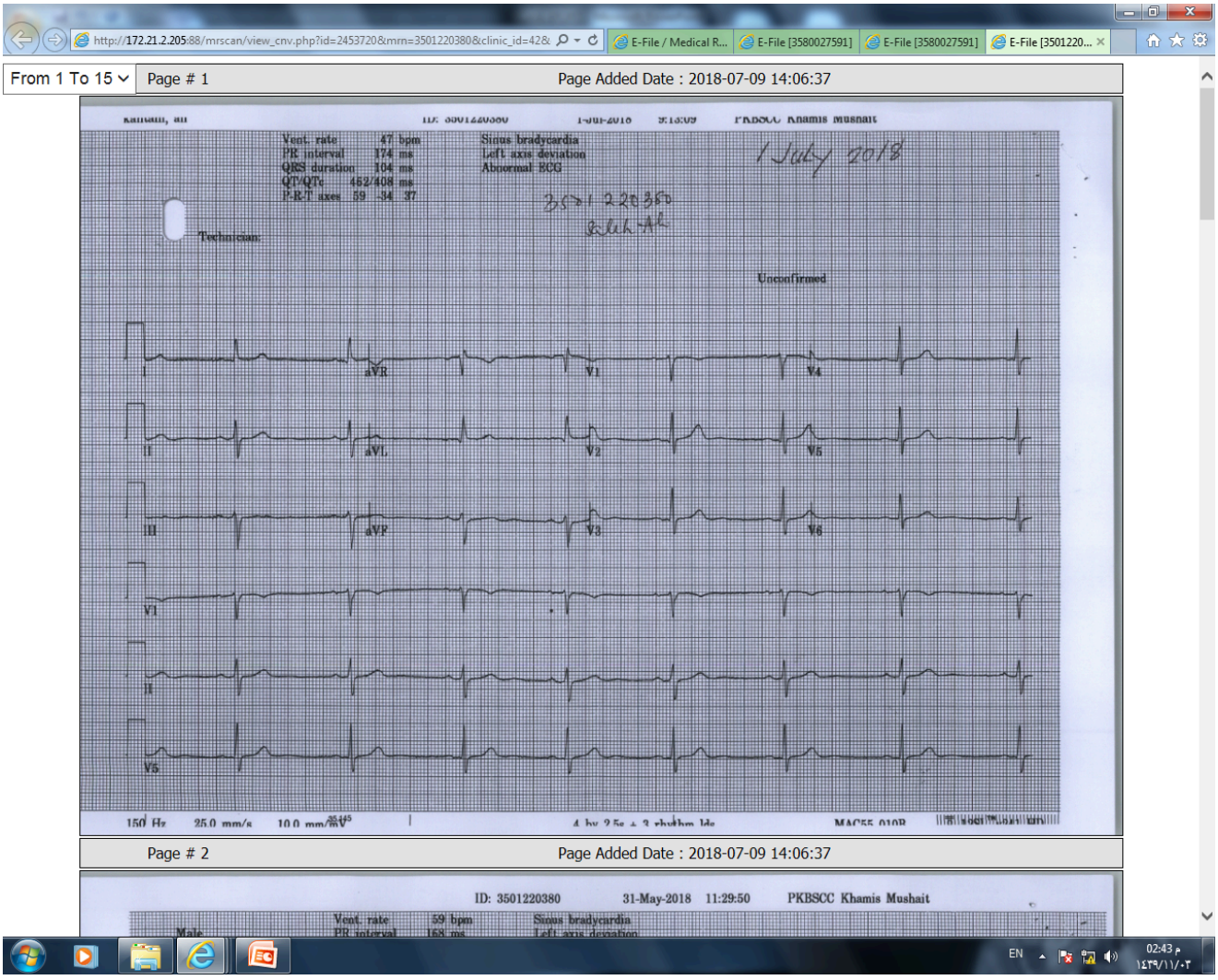


Figure 6: Case 3 — Resting Sinus Bradycardia Post Sleeve Gastrectomy

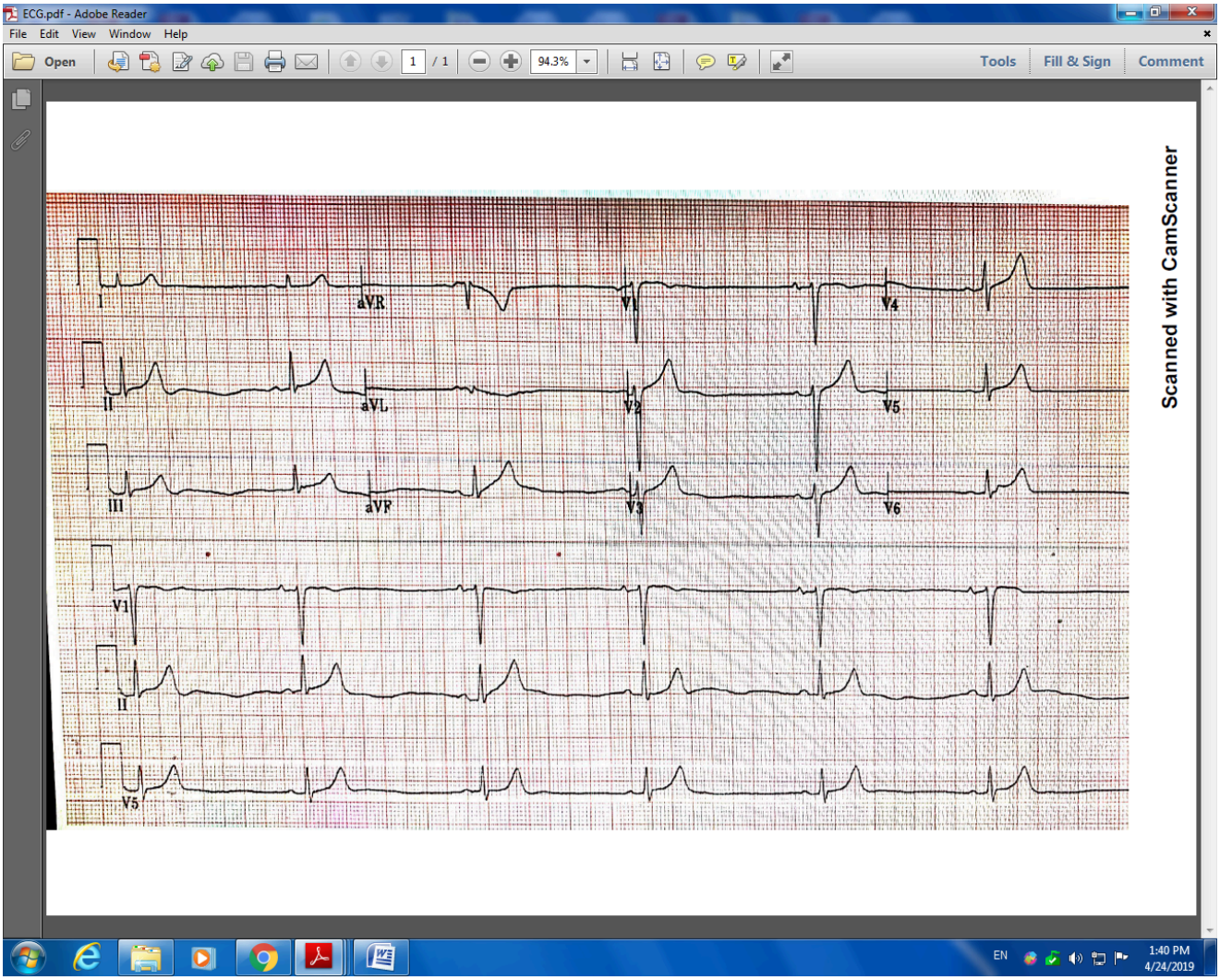


Figure 7: Case 3 — Ambulatory ECG Recovery Strip