Insulinoma, A Rare Neuroendocrine Tumor: A Case Report

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Abstract

We report a case of Insulinoma, a rare neuroendocrine tumor with an incidence of approximately four per 5 million. This case demonstrates the characteristic clinical, biochemical and histological features of an insulinoma, a rare benign neuroendocrine tumor where early recognition is important to ensure proper surgical treatment and prevent serious adverse consequences.

Case Report

A 46 year old female presented to the emergency department with seizures. Her serum glucose level was 28mg/dl (70-110 mg/dl). She denied any use of oral hypoglycemic agents or insulin intake. The patient was treated with dextrose infusion with serum glucose levels ranging from 50-60 mg/dl. While in the emergency department the patient became sweaty and lethargic. Physical examination revealed an obese patient (208 lbs) with normal vital signs, but was otherwise unremarkable. Past medical history revealed subtotal thyroidectomy for graves disease, craniotomy for cerebellar hemangioblastoma without any recurrence, and episodes of disorientation which was thought to be transient near syncope with undetermined etiology. She was subsequently diagnosed with seizure disorder controlled with medications.

The patient was subsequently admitted to the hospital for further investigations. During a 24 hour fast, her blood glucose decreased to 48mg/dl, but she was entirely asymptomatic. The serum glucose with exercise was monitored and ranged from 45-50 mg/dl. During a 36-hour test, the patient remained asymptomatic. The etiology of the hypoglycemia remained unknown. However, approximately thirty minutes after meals, she developed diaphoresis, lethargy and mild tremulousness. Blood glucose at that time was 28mg/dl. The patient was treated with dextrose 50 intravenously with resolution of symptoms. Thirty minutes later, she developed recurrent symptoms with a blood glucose level of 35 mg/dl. Again she was given dextrose 50 with resolution of symptoms. At this point, the patient was placed on dextrose 10 overnight with no further symptoms observed. The following day for the entire 24 to 36 hour period, the patient was off of dextrose 10 and remained asymptomatic. The blood glucose ranged

from 48 to 80mg/dl. Further testing showed a negative sulfonylurea screen, normal somatomedin-C and within normal limits liver function tests and insulin antibodies 0.4% (normal range: 1.1% or less).

The CT scan of the abdomen revealed no evidence of any lesions in the liver or any evidence for an abdominal tumor that might be a secondary cause for her hyperinsulinemic levels. The patient was subsequently discharged with a diagnosis of postprandial hypoglycemia with the possibility of an insulinoma. She was subsequently referred to endocrinology for consultation and was readmitted for a 72 hour fast. On the 40th hour of the fast, she started to develop blurring of vision and her laboratory tests showed the following: Blood glucose of 32 mg/dl (70-110 mg/dl), Insulin level $32\mu U/ml$ (0-22$\mu U/ml$), and C-peptide 3.5mg/ml (0.5-3.0 mg/ml). The symptoms were relieved with administration of Dextrose 50. These studies showing fasting hypoglycemia accompanied by symptoms and reversal of the findings after administration of glucose are conclusive for an insulinoma.

A localization test by calcium arterial stimulation test revealed greater than a 200 fold rise in insulin in the superior mesenteric artery. This suggested that the patient's insulinoma was located in the uncinate process. The patient underwent exploratory laparotomy enucleating the 1.5-cm insulinoma that was on the surface of the uncinate process of the pancreas. Intraoperative ultrasound of the rest of the pancreas found no evidence of other lesions. The patient's symptoms resolved after the surgery and random serum glucose levels returned to normal 96mg/dl (60-200 mg/dl).

Pathologic Findings

The gross specimen revealed a friable lobulated pink mass measuring 1.7 x 1.5 x 1.1cm. Histologic examination revealed a well circumscribed tumor nodule composed of endocrine type cells with round uniform nuclei and basophilic cytoplasm. The pattern of growth was primarily solid with intervening vascularized stroma (Figure 1). There was no evidence of atypia or increased mitotic activity. The lesion appeared to be separated from the pancreas by a fibrous band. Majority of the tumor cells showed positive staining for insulin on immunohistochemical stain (Figure2).

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Self-reporting of Internal Medicine House Staff Work Hours

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Abstract

Introduction: The 80-hour workweek became a reality for residency programs nationwide on July 1, 2003. In this review of administrative data, we examine the self-reporting of work hours by a cohort of Internal Medicine residents.

Methods: Data was collected from 27 residents in training at Tripler Army Medical Center over a 4 month period from September 1 to December 31 2002. House staff reported their hours on a daily basis by responding to an email message, as well as on a monthly basis utilizing the Army's UCAPERs (Uniform Chart of Account Personnel System) mandatory monthly workload tracking system. Data from the two separate reporting systems was compared for accuracy, completeness and internal consistency.

Results: Compliance with daily reporting was variable (67-97% with overall compliance rate of 86%) but lower when compared with the mandatory military monthly reporting system (95-100%). There were large differences in reporting of average weekly work hours among individual residents when monthly reporting was compared to daily reporting of data with higher averages with monthly data reporting. Weekly totals averaged nearly 12 hours higher when reported monthly compared to reporting on a daily basis ($p < 0.0001$). A total of 18 residents reported that they worked more than 80 hours per week during one month using monthly data, while only 7 reported that they averaged more than 80 hours with the daily reporting data. When average weekly hours reported on a daily basis were compared with the total number of inpatient days worked over the four month period using a simple regression model, there was a significant relationship with average hours increasing with increasing number of inpatient days worked (adjusted R square $= 0.19$, $p = 0.01$).

Conclusions: Little internal consistency was found in the comparison of daily versus monthly work hour reporting, indicating that self-reporting may not provide accurate data. Complying with the 80-hour workweek is crucial for residency programs to maintain accreditation, and thus programs will need a way to accurately capture consistent resident work hour data. Further studies are indicated to determine the most accurate way of assessing house staff work hours.

Introduction

The Association of American Medical Colleges (AAMC) and Accreditation Council for Graduation Medical Education (ACGME) have mandated an 80-hour workweek for resident physicians in training, and this has become the accepted standard throughout the country as of July 1, 2003. Residency programs in New York have had similar laws regulating resident work hours since July 1989. However, recent studies have shown that compliance remains a major issue[1-6]. There is little scientific data in the literature on the quality or validity of work hour data or how it is currently collected. The typical method used by most programs is resident self-reported hours on an "honor system" basis without mechanisms to verify or validate the data. Our goal in this review was to define the accuracy of self-reported work hour data from a cohort in an Internal Medicine Residency.

Methods

The Tripler Army Medical Center (TAMC) Internal Medicine Residency program is an ACGME accredited military residency averaging 24 residents in training. In this retrospective review of administrative data, house staff reported their hours on a daily basis by responding to an email message. This required roughly 3-4 keystrokes daily to complete. Policy was widely disseminated through house staff meetings, the house staff manual and personal communications in addition to daily e-mail. Data from September 1 to December 31 2002 was reviewed. Residents worked a total of 125 4-week blocks over this period of which 70 were inpatient rotations (56% of the total). There were 27 residents in training (7 female, 10 PGY-1, 8 PGY-2, 9 PGY-3) with an average age of 28 years who reported their work hours. This data was then compared to the Army's UCAPERs (Uniform Chart of Account Personnel System) mandatory monthly workload tracking system for the same period in an attempt to validate the usefulness of self-reporting. All Army personnel are required to enter this data monthly. This monthly requirement does not have a specific mandated frequency of data entry (unstructured monthly reporting). If data was not self-reported, scheduled work hours were used, and it was assumed that house staff had 1 day off per week.

Daily reported data was adjusted for compliance with an assumption that average hours were roughly the same for individual residents on days that were not reported. Two out of 27 residents did not provide data as they did not report their work hours on a daily basis at all. The daily self-reported data on average weekly work hours was compared using simple regression with the total number of days worked by each resident on inpatient rotations (which typically account for the highest average weekly work hours). Data was tabulated and statistical analysis was performed using Microsoft Excel 2000.

Results

Individual compliance with daily reporting was variable, ranging from 59-97% with overall compliance rate of 86%. Quartile means for compliance were 79% for the lowest quartile and 94% for 3rd quartile (n=25). Compliance with the monthly reporting system is mandatory. In a few cases where monthly reports were not submitted in a timely fashion, monthly data was completed by program staff using scheduled work hours.

There were large differences in reporting of average weekly work hours among individual residents when monthly and daily reporting methods were compared (see figure 1). The range was from +34 to –6 hours per week. The vast majority of residents (23/25) reported higher average hours with monthly reporting than they did with daily reporting.

When adjusted for compliance, aggregated mean hours using daily reporting were 61.5 per week (standard deviation 8.6) versus 71 hours per week (std. dev. 10.6) with monthly reporting (average difference was +9 hours per week) for interns. For residents, the aggregate difference was greater with an average of 54 hours per week (std. dev. 7.0) with daily reporting versus 68 hours per week (std. dev. 9.6) with monthly reporting for an average difference of +14 hours per week (see figure 2). The difference in mean work hours for all house staff was 11.9.

Figure 3 shows the number of residents reporting that they worked more than an average of 80 hours per week by month. A total of 18 residents reported that they worked more than 80 hours per week during a single month using monthly data, while only 7 reported that they averaged more than 80 hours with daily reported data.

Average weekly hours reported on a daily basis were compared with the total number of inpatient days worked over the four month period using a simple regression model. There was a significant positive relationship between average weekly work hours and number of inpatient days worked (adjusted R square = 0.19, p = 0.01, see Figure 4). There was no significant relationship between average weekly hours reported on a monthly basis and number of inpatient days worked (p=0.3).
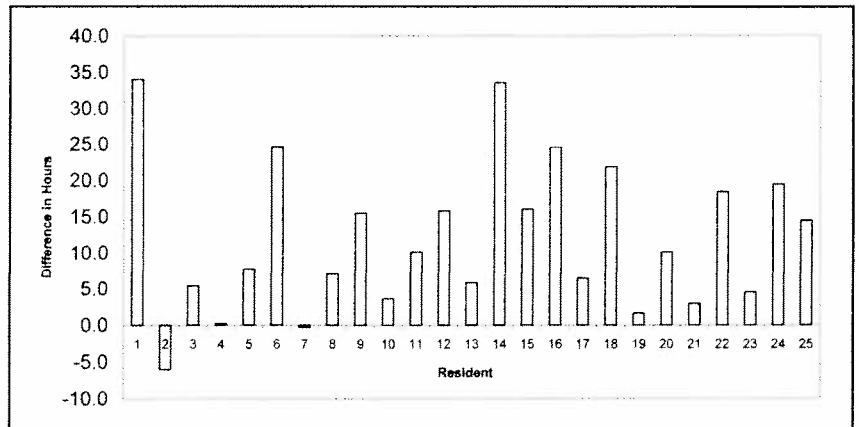

Figure 1.— Average difference in reported weekly work hours for individual residents - monthly vs. daily self-reporting, September-December 2002.
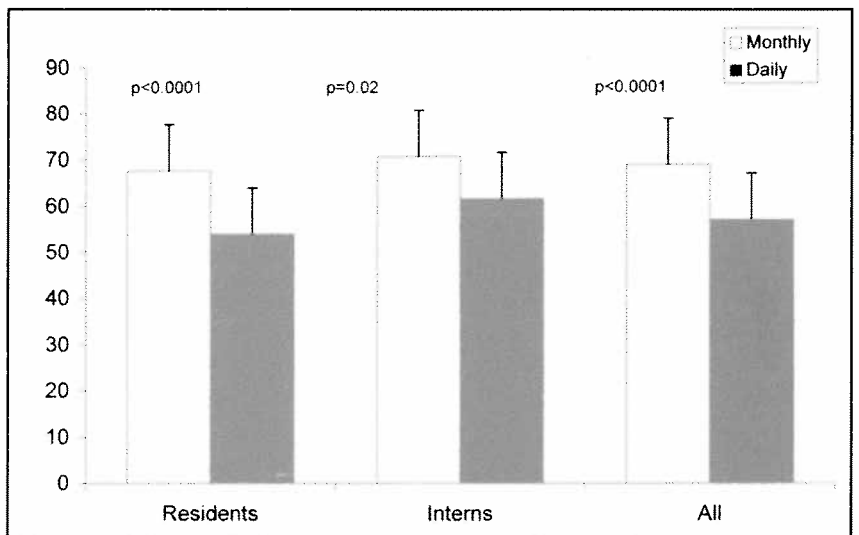

Figure 2.— Difference in aggregate mean weekly resident work hours, monthly vs. daily self-reporting, September-December 2002.
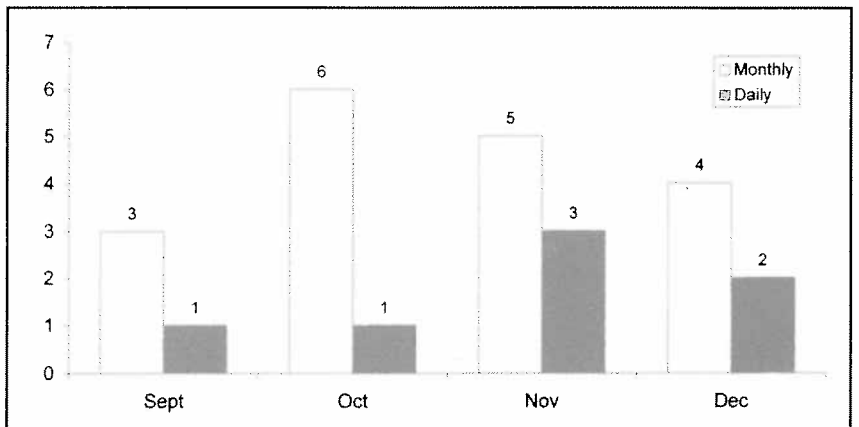

Figure 3.— Residents reporting over 80 hours per week by month, monthly vs. daily self-reporting, September-December 2002.