Wernicke Encephalopathy Post Gastric Bypass Surgery

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Bariatric surgery is recognised as the most clinical and cost-effect treatment for people with severe and complex obesity.[1] Bariatric procedures comprise of restrictive techniques such as gastric banding and sleeve gastrectomy, malabsorptive techniques such as biliopancreatic diversion and duodenal switch, or a combination of both such as roux-en-Y (RYGB) and one-anastamosis gastric bypass. The RYGB is currently the predominant surgery performed at the University Hospital of North Midlands NHS Trust (UHNM).

Micronutrient deficiencies are a well-known complication of bariatric surgery. Wernicke's encephalopathy (WE), a neurologic manifestation of thiamine (vitamin B1) deficiency is a rare, but serious, complication of bariatric surgery.[2] WE is characterised by the classic triad of ataxia, altered mental status and eye movement disorders;[2] although, the full triad is often not seen. If left untreated it may lead to a state of chronic mental dysfunction, known as Korsakoff's syndrome.[3]

Thiamine is a water-soluble vitamin necessary for the release and utilisation of energy from food and the normal functioning of the nervous system.[4] The RYGB involves bypassing the entire duodenum and the first portion of the jejunum. Thiamine is mainly absorbed in the upper jejunum; it has a short half-life (1-12 hours) and the body can store it for 1-3 weeks.[5] Thus, in cases of recurrent vomiting, inadequate nutrition and malabsorption, the body's thiamine reserves are quickly depleted.

Here, I will describe the case of a young woman, Ms P*, who presented at hospital with ataxia, nystagmus and confusion after RYGB.

Case Study

Ms P, a 24-year-old female with a history of morbid obesity, was referred to the bariatric service by her GP for assessment for bariatric surgery (**Table 1**). As per the UHNM bariatric pathway, Ms P was first seen in joint clinic with the consultant, nurse specialist and dietitian in February 2016. She was accepted into the service as she fulfilled the National Institute for Health and Care Excellence (NICE) criteria of BMI >40 kg/m^2 with no-comorbidities, and reported that she had tried alternative methods in order to lose weight, including Weight Watchers and Slimming World.[6] There is no tier 3 service locally.

All patients are required to lose some weight prior to surgery. When Ms P was assessed, the accepted target weight loss was between 5-10 kg. This is encouraged in order that the patient shows commitment to changing their eating habits. Ms P was asked to lose 10 kg.

A diet history revealed Ms P was a shift worker who relied on sugary drinks and regular high energy snacks; the goal was to reduce these and improve the overall balance of her diet. In March, the patient was discussed at a multidisciplinary team (MDT) meeting (attended by dietitian, consultants, anaesthetist and nurses), during which Ms P's target weight loss was revised from 114 kg to 119 kg, hoping a more achievable target would improve motivation.

*The name of patient has been changed to protect patient confidentiality.

Ms P did not attend (DNA'd) dietetic appointments. She was seen again in September 2016 and had managed to lose 1.5 kg. However, in December 2016, she was dated for surgery. At this point Ms P was contacted and prepared for surgery. As per the UHNM dietetic pathway, it involves managing a patient's expectations of surgery, discussing the post-operative build up diet, common food tolerance issues, eating techniques and advice on post-operative multivitamin and mineral supplementation. It was noted during the clinic consultation that Ms P was back to her initial weight (124 kg).

Ms P underwent a non-eventful laparoscopic gastric bypass in January 2017.

First hospital admission – 6 weeks post-op

Ms P presented in A+E with vomiting and abdominal pain. She was admitted to the ward, received intravenous anti-emetics and an oesophago-gastro-duodenoscopy (OGD), which showed a healing duodenal ulcer. She was discharged home after 7 days with a higher dose proton pump inhibitor. Ms P was not referred to the dietitians during this admission.

Second hospital admission – 8 weeks post-op

Ms P presented at A+E with confusion. Her family reported that she was suffering with headaches and dizziness on mobilising. She was admitted to the surgical ward complaining of nausea and vomiting. She had an abdominal X-ray, which showed no obstruction, and serum B vitamin results were requested. On day 2 she was seen by the neurological team who noted nystagmus and requested a complete confusion screen.

She was reviewed by Endocrinology on day 3 who suggested a likely the diagnosis of WE, based on recent RYGB and current clinical symptoms. Pabrinex was instigated, which was commenced for 5 days, and then changed to oral thiamine. Vitamin B1 results took some time to come back, when they did, indicated levels were below the reference intake: 31 nmol (reference range 50-100 nmol).

Ms P was referred to the dietitian on day 2 of her admission and reviewed on day 3. Pabrinex had been commenced and it was noted the patient was acting out of character and requesting inappropriate post-bypass foods. Ms P's family reported that she was behaving like she was intoxicated. Ms P lacked insight into her situation due to the WE, so support and advice were provided in helping her to make appropriate food choices. The concern was that making poor choices may cause dumping syndrome or tolerance issues.[7]

Following bariatric surgery all patients are required to take a complete A-Z multivitamin and mineral supplement.[1] Dietetic input also included ensuring that the patient was on all appropriate vitamin and mineral supplements (**Table 2**).

After two days of Pabrinex the improvement in her mental status was significant, she was less confused and more alert.

Ms P was transferred to neurology where she underwent an MRI that showed appearances in keeping with WE. She had on-going ataxia and received regular physiotherapy support. Although she did not get back to baseline at time of discharge, she was considered to be medically optimised. She was discharged with long-term supplementation of oral thiamine in addition to the standard multivitamins and minerals post-op.

Follow-up

Ms P was seen in dietetic clinic until March 2019, when she was discharged back to the care of the GP after she DNA'd her final appointment. Non-compliance with taking multivitamins and minerals was an issue in all follow up appointments. Non-compliance is common in WE patients and could be viewed as a more discrete symptom of the disorder.[2] Ms P needed prompting from all healthcare professionals involved in her care to take her medications. She usually attended dietetic appointments with a friend or family member, so they were asked to support Ms P with this daily care. Written information was provided encouraging the inclusion of thiamine rich foods into her diet. Ms P had residual on-going symptoms of WE up until her 18-month review with neurology, when they determined that her nystagmus and ataxia had resolved. Whilst Ms P's surgery resulted in excellent weight loss (**Figure 1**), there was a significant personal impact from the WE diagnosis on Ms P:

- She was left unable to look after her two children alone for six months after her diagnosis
- She voluntarily stopped driving due to the severity of her symptoms. This was reinstated on agreement with the neurology consultant after 18 months
- She had to be supervised when cooking due to forgetfulness for one year after her diagnosis.

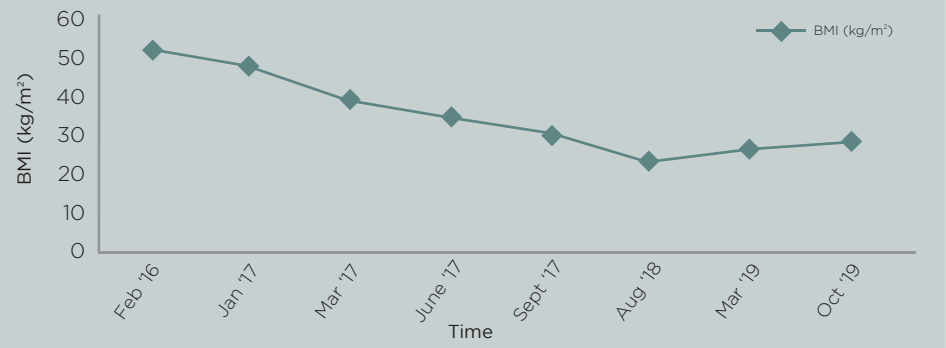
Table 1: Initial assessment

Weight	124 kg
BMI:	52 kg/m^2
Excess body weight	64.7 kg
Ideal body weight	59.3 kg
PMHx	2 x c-sections, cholecystectomy
Social Hx	2 children, works nights as a support worker. Supportive family.

Table 2: Recommended post-op build-up diet

Weeks 1-2	Liquids only, no bits
Weeks 3-6	Puree diet
Week 7	Soft diet
Week 8 onwards	Normal, healthy balanced diet

Figure 1: Weight loss over time



"Thiamine is a water-soluble vitamin necessary for the release and utilisation of energy from food and the normal functioning of the nervous system.[4]"

Discussion

Ms P is the first case of WE to be diagnosed at UHNM after bariatric surgery. Prevention of neurological complications can be improved through close postsurgical follow-up of nutritional status.[8] Ms P was scheduled for a dietetic appointment at 8 weeks post-op. She DNA'd this appointment and then presented at A+E two days later. Whilst Ms P had a poor record in attending dietetic appointments prior to surgery, this missed appointment may have been due to feeling unwell/ effects of WE.

WE occurs in less than 1% of all patients after receiving bariatric surgery, although the condition is likely underdiagnosed.[8] The treatment of WE is time precious and recognising the signs and symptoms, along with evaluating medical history, is critical to the early diagnosis and treatment of this serious yet treatable condition.

The British Obesity & Metabolic Surgery Society (BOMSS) guidelines recommend that if a patient presents with rapid weight loss, poor dietary intake, vomiting, alcohol abuse, oedema or symptoms of neuropathy to initiate treatment for thiamine deficiency immediately. Do not delay pending blood results.[1] Ms P presented with vomiting for both admissions, in line with BOMSS guidelines she should have been initiated on thiamine. Why did she continue to vomit after this first admission? Patients can struggle with the post-op build up diet (**Table 3**), and often report disliking the puree stage. Ms P was provided with information on the post-op diet on two occasions and all patients are encouraged to call us if they have any concerns or questions before they receive their first dietetic appointment at 8 weeks post-operatively.

Table 3: Recommended vitamin & mineral supplementation post RYGB (as per BOMSS Guidelines)

Forceval once daily
Ferrous Sulphate 200 mg daily
Fultium D3 800 IU daily
B12 injections 1 mg every 3 months

Studies have shown that patients who see a dietitian have more favourable thiamine levels at three-months post-surgery.[9] It's unfortunate that Ms P was not referred to the dietitians during the first admission and that there was a delay in referring her at her second admission – bariatric dietitians are well placed to determine patients at risk of thiamine deficiency. The bariatric consultant had requested serum B vitamin results, however, the BOMSS guidelines advice against waiting for the results. To Ms P's detriment there was a delay in initiating replacement thiamine.

Dietetically, Ms P was not ready for surgery, having been unsuccessful at sustaining any significant weight loss, in addition to multiple non-attendances with dietetic appointments, showing failure to commit to the process. There is no local tier 3 service for our patients, therefore regular attendance of dietetic appointments prior to surgery is vital to ensure that patients are nutritionally optimised in preparation for surgery, as well as preparing them for the significant change in eating habits post-operatively. On this occasion Ms P was listed for surgery despite not having achieved her target weight. It can be more difficult to manage patients' expectations of surgery when they are already dated for surgery. Ms P should have been brought back to the MDT for a second time to be cleared by the dietitian.

Lesson learned

- Members of the team have a better awareness of the symptoms and risk factors of thiamine deficiency and the importance of initiating treatment quickly
- When discussing the practicalities and realities of surgery with patients, we continue to ensure that patients are aware of the risks of vomiting post-operatively and to contact the team if this occurs
- The importance of adherence to supplementation is an important part of pre-operative education
- Good MDT working with nurses and consultants is vital to ensure that they inform us of any concerns they have with patients and if they have been admitted
- This case highlights the importance of dietetic input at MDT meetings, as we can illustrate when patients need more time to make the necessary lifestyle changes and are not ready for surgery. All patients must now be deemed ready dietetically at MDT meetings
- BOMSS guidelines suggest considering recommending oral thiamine or vitamin B co strong tablets for the first 3 to 4 months post-surgery. This is not something we currently do at UHNM, although we will continue to re-evaluate. The strategies mentioned will help to minimise the risk of developing WE and we continue to assess for risk factors for thiamine deficiency in post-op dietetic appointments.

References: **1.** O'Kane, et al. (2020). British Obesity and Metabolic Surgery Society on Perioperative and postoperatively biochemical micronutrient replacement for patients undergoing bariatric surgery. Nutrition Guidance. Accessed online: www.bomss.org.uk/bomss-nutritional-guidance_2020 (Mar 2021). **2.** Oudman, et al. (2018). Preventing Wernicke Encephalopathy After Bariatric Surgery. Obes Surg.; 28(7): 2060-2068. **3.** Azra Z (2015). Wernicke's encephalopathy following Roux en Y gastric bypass surgery. Saudi Med J.; 36(12): 1493-1495. **4.** Mann J, Truswell S (1998). Essentials of human nutrition. Oxford University Press. **5.** Pacei F, et al. (2020). The relevance of thiamine evaluation in a practical setting. Nutrients; 12(9): 2810 .**6.** National Institute of Health Care Excellence (NICE) (2014). Obesity: identification, assessment and management. Clinical guideline [CG189]. Accessed online: www.nice.org.uk/guidance/cg189/chapter/1-Recommendations (Nov 2020). **7.** Tack J, Deloose E (2014). Complications of bariatric surgery: Dumping syndrome, reflux and vitamin deficiencies. Best Pract Res Clin Gastroenterol.; 28(4): 741-749. **8.** Chang H-W, et al. (2019). Wernicke encephalopathy concurrent with polyradiculoneuropathy in a young man after bariatric surgery. A case report. Medicine (Baltimore).; 98(10): e14808. **9.** Garg, et al. (2016). A postoperative nutritional consult improves bariatric surgery outcomes. Surg Obes Relat Dis.; 12(5): 1052-1056