Laparascopic subtotal pancreatectomy in persistent hyperinsulinemic hypoglycemia of infancy

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Vol. 12, No. 1 (2008-10 - 2008-12)

Curr Pediatr Res 2008; 12 (1 & 2): 19-21

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Keywords: Persistent hyperinsulinemic hypoglycemia of infancy, hypoglycemia, nesidioblastosis

Accepted October 07, 2007

Abstract

Two and half-year old Saudi boy was diagnosed with persistent hyperinsulinemic hypoglycemia of infancy (PHHI). He was initially managed with diazoxide and octreotide, however he was medical therapy unresponsive. Surgical intervention was recommended and he had laparoscopic subtotal pancreatectomy. This is the first reported Saudi case of PHHI who was managed surgically using the laparoscopic technique and showed its safety and feasibility. We believe that laparoscopic subtotal pancreatectomy should be the initial surgical approach in PHHI children who fail the medical therapy. If the initial surgical resection was inadequate and the patient is still hypoglycemic, further pancreatic resection can be easily performed laparoscopically in the absence of adhesions and scarring.

Introduction

Persistent hyperinsulinemic hypoglycemia of infancy (PHHI) formerly known as nesidioblastosis, is a glucose metabolism disorder characterized by profound hypoglycemia and inappropriate secretion of insulin [1]. Affected children run the risk of severe neurological damage unless immediate and adequate steps are taken [2,3]. PHHI may be inherited in both autosomal recessive and dominant forms, however the majority of the cases are sporadic. At the molecular level, mutations in the sulphonylurea receptors (SUR 1) and the potassium inward rectifying receptors (Kir6.2) have been identified in the autosomal recessive forms [4,5]. Autosomal dominant forms may be caused by activation mutation of glutamate dehydrogenase gene [6] or glucokinase gene [7]. The in-cidence of PHHI in the general population is 1:50,000 live births [8] but in countries with substantial inbreeding such as Saudi Arabia the incidence may be as high as 1:2500 [9]. Treatment with diazoxide and/ or soma-tostatin analogue is not always effective, necessitating an intervention such as pancreatectomy [3].

The majority of Saudi patients is medical therapy unresponsive and need pancreatectomy [10,11]. Subtotal or near total pancreatectomy through the open laparatomy approach is associated with several post-operative complications such as intestinal ileus and prolonged fasting [10]. An alternative minimally invasive approach is the laparoscopic subtotal pancreatectomy. We describe in this report, a 25-year old Saudi boy with PHHI who was managed successfully with laparoscopic pancreatectomy. To our knowledge, this is the first reported laparoscopic subtotal pancreatectomy to be performed in a Saudi child with PHHI which indicates that pancreatectomy through this approach is feasible, safe and curative.

Case Report

This two and half-year old Saudi boy was a product of full term spontaneous vaginal delivery with a birth weight of 3.8 kg and length of 51 cm. He presented within the first few days of life with recurrent hypoglycemic convulsive attacks. PHHI was suspected based on his high intra-venous glucose requirement of more than 12mg/kg/min to

maintain euglycemia and hyperglycemic response to in-tramuscular glucagon injections. His insulin (µU/ml) to glucose (mg/dl) ratio was more than 0.3. Insulin level was µU/ml while he was hypoglycemic (blood glucose was less than 40mg/dl). He had normal growth hormone (GH), cortisol, adrenocorticotropin (ACTH) levels and normal blood spot acylcarnitine profile. GH level was 28 mU/l, cortisol level was 542 nmol/l and ACTH level was 32. He had normal ammonia level and negative urinary ketones.

This child was started on diazoxide 10mg/kg/day divided into 3 doses, however euglycemia was not achieved. Diazoxide dose was increased to 15mg/kg/day and octreotide as an adjunctive therapy was started. He was initially started on 20mcg/kg/day distributed every 6 hours which then increased to 40mcg/kg/day 4-hourly injections. He was kept euglycemic on this medical therapy and frequent feeding which was supplemented with complex carbohydrate corn starch (polycose) until the age of 2 years. However, he gained weight and his mother admitted that he is not able to cope with frequent feeding and close supervision. He gradually became unresponsive to medical therapy and developed intolerance to octreotide. He developed again frequent hypoglycemic attacks and some of them were associated with convulsion. The surgical therapeutic option was discussed with the family and the laparoscopic approach was suggested.

He was admitted 2 days prior to the day of surgery to stabilize the blood glucose level. He had rapid sequence intubation and nasogastric tube insertion to avoid gastric inflation with air bagging. Rectal tube was used to achieve maximum colonic decompression. Three ports laparoscope was used; one for camera and two as working ports. The stomach was retracted up towards the anterior abdominal wall to expose the lesser sac. The pancreas was resected from the splenic hilum to the mesenteric vessels. The splenic vein was dissected from under the surface of the pancreas using electrocautary and the spleen was preserved. The pancreatic mobilization and dissection was progressed medially to the right using the Hood-Cautry instrument and the landmark dissection. The transaction of pancreatic tissue was done using an Endo-GI stapling-Cutting device. A TP drain was left in the lesser sac. No focal lesions were observed intra-operatively. The duration of surgery was 2 hours and the patient was fed during the first 24 hours post-operatively with no post-operative complications

Discussion

Post-operative short-term complications of open laparatomy subtotal pancreatectomy in children with PHHI include intestinal ileus and prolonged fasting and hospitalization. These children may not tolerate oral feeding and need total parenteral nutrition (TPN). We previously reported our experience with 38 children with PHHI where 29 of them were medical therapy unresponsive and had an open laparatomy subtotal pancreatectomy. Four children, post-operatively, had prolonged intestinal ileus and required TPN [10]. The duration of surgery ranged from 4 to 6 hours and the duration of post-operative hospitalization ranged from 10 to 21 days. We report here our experience with a child who had a neonatal onset of PHHI and was diazoxide/octreatide unresponsive. He was successfully managed by laparoscopic subtotal pancreatectomy and had an uneventful post-operative course.

Subtotal pancreatectomy in PHHI patients was previously reported in 3 studies [12-14]. The first case was performed in a 4-week old infant who was fed immediately post-operatively; however, euglycemia was not achieved and required open near total pancreatectomy [12]. It was reported that the laparoscopic surgery was not complicated with scaring and adhesions and the re-do surgery was easily performed. The laparoscopic approach was beneficial in identifying the focal lesions in focal PHHI cases. Two children underwent laparoscopic pancreatic inspection and two focal lesions were identified at the head of the pancreas [13]. In another 2 children with focal lesions, laparoscopic enucleation of the lesion was cura-tive and did not result in diabetes secondary to near total pancreatectomy [14].

To our knowledge, this is the first reported Saudi case of PHHI who was managed surgically using the laparoscopic technique and showed its safety and feasibility. We believe that laparoscopic subtotal pancreatectomy should be the initial surgical approach in PHHI children who fail the medical therapy. If the initial surgical resection was inadequate and the patient is still hypoglycemic, further pancreatic resection can be easily performed laparoscopically in the absence of adhesions and scarring.

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