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Complications after Percutaneous Endoscopic Gastrostomy (PEG) in Paediatric Patients

Abstract

Background and Aim: Percutaneous Endoscopic Gastrostomy (PEG) provides for enteral nutrition in children with feeding problems. PEG, however, is not without complications. The present study has the aim to identify the incidence of major and minor complications after PEG placement.

Methods: All patients receiving a PEG in the period 2008-2011 were reviewed. In a 4 years period we positioned 41 PEG in 41 patients. Their age range was variable between 1 and 16 years.

Results: Nine of the 41 patients (21.9 %) developed complications. In 2 cases (4.9%) there were major complications. In one case of gastro-colic fistula a redo surgery was performed that consisted in the fistula closure and a redo gastrostomy. This patient moved a legal action against the hospital. In the second case the child developed a pneumoperitoneum without peritonitis for a wrong position of the tube and also this patient was re-operated to well position the tube and to fix the stomach to the skin. In 7 cases (17 %) there were 7 minor complications: 3 cutaneous orifice enlargement with skin inflammation, 2 granulomas and 2 PEG's breakdown.

Conclusion: PEG placement is generally considered a minor and safe procedure. However, the incidence of complications after PEG placement, according with the literature reports, is variable between 10 and 20 %. We report about 5 % of major complications that required a redo surgery. It is important to write in the informed consent that complications after PEG placement are possible and sometimes a redo surgery is required.

Keywords: PEG; Gastrostomy; Children; Complications

Introduction

Gastrostomies are commonly placed in children for a number of indications. According with literature data, it seems that the main indication for gastrostomy placement in children is represented by feeding problems and malnutrition [1]. Since the original report of the Percutaneous Endoscopic Gastrostomy (PEG), there was a radical shift in paediatric surgery from the open to the percutaneous technique [2]. This technique aimed to reduce the risks of a laparotomy under general anesthesia and the morbidity of a formal laparotomy. PEG, however, is not without complications. They can be minor problems such as wound infection, skin excoriation, and granulation tissue at the exit site and major complications as peritonitis, hemorrhage, intestinal obstruction, and gastroenteric fistula formation [3-5]. In general the procedure is performed by a pediatric gastroenterologist alone or in collaboration with a pediatric surgeon. PEG is considered a simple procedure to perform and sometimes the need of an informed consent signed by the parents before the procedure is an under-evaluated problem, and there are scanty data in the literature about this point [6]. The present study has the aim to identify the incidence of major and minor complications after PEG placement in our Department of Pediatrics.

Patients and Methods

The files of all patients receiving a PEG in our Department of Pediatrics in the period 2008-2011 were reviewed. In a 4 years period we positioned 41 PEG in 41 patients. In all cases the indication to position a PEG were feeding problems and/or malnutrition. There were 25 boys and 16 girls with an age range variable between 1 and 16 years (median 4.7 years). Their weight ranged between 4 and 25 kgs (median 11 kgs). Nineteen/41 patients (46.3%) were neurologically impaired with a tetraparesis that lived on a wheel chair. An exclusion criterion of this study was the presence of a concomitant gastroesophageal reflux and the need of an antireflux procedure. All the procedure was performed in the operative theater with patients in general anaesthesia. All PEGs were placed by a two-headed team of a pediatric gastroenterologist and a pediatric surgeon or trainee. We used the "pull" technique as described by Gauderer with some small modifications [6,7]. This is a method by which the gastrostomy catheter is pulled down the esophagus, into the stomach, and out the abdominal wall. In our setting, the endoscopist and the surgeon work on the same monitor.

Results

All the procedures were completed successfully without the need to convert to a surgical gastrostomy. Length of surgery varied between 15 and 45 minutes (median 24 minutes). The PEG's kits

that we used were produced by different brands and they were fixed on the skin according to the instructions presents in the kit. Of the 41 patients 9/41 patients (21.9%) developed complications (Table 1). All of these children had undergone a normal PEG procedure. To make our data comparable with other series, major complications were defined as those procedure-related complications needing a surgical procedure, non-prophylactic antibiotics, or blood transfusion, and procedure-related death.

In 2 cases (4.9%) we recorded major complications. In one case of gastro-colic fistula (Figure 1) a redo surgery was performed that consisted in the fistula closure and a redo gastrostomy. The parents of this patient moved a legal action against the hospital. In the second case the child developed a pneumoperitoneum without peritonitis for a wrong position of the tube and also this patient was re-operated to well position the tube and to fix the stomach to the skin (Figure 2). In 7 cases (17 %) there were 7 minor complications: 3 cutaneous orifice enlargements with skin inflammation, 2 granulomas (Figure 3), and 2 PEG breakdown. All these minor complications were treated in a day hospital setting.

Discussion

Although PEG is a minimally invasive procedure, minor and major complications remain a topical problem [3-5]. In particular the most dangerous part of the procedure, consisting in the introduction of the needle into the stomach, remains a blind procedure and it is performed without vision. Gastrocolic or gastrocolocutaneous fistulas are one of the major complications of a blind procedure such as PEG and they have an incidence of 2-8 % [8]. There are several reasons that can be the cause of a complication, the transverse colon lies in front of the stomach and is displaced downward when the stomach is inflated. An underinflated stomach may fail to displace the colon; or an overinflation may lead to gas entering and distending the small bowel, hence lifting the colon upward [9].

For these reasons small bowel perforation, intestinal obstruction, and hemorrhage have all been reported by several teams [10]. In addition peritonitis after attempted PEG change has also been reported, the most common cause being inadvertent removal soon after PEG insertion. Peritonitis immediately after PEG insertion has also been observed,

Table 1: Complications recorded in our series of patients after PEG placement.

Complications	n (%)
Major complications	2 (4.9%)
Gastrocolic fistula, pneumoperitoneum	
Minor complications	7 (17%)
cutaneous orifice enlargement with skin inflammation, granulomas, PEG's breakdown	

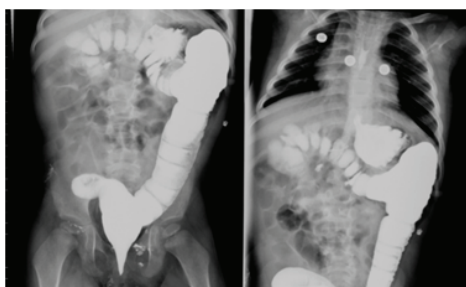


Figure 1: Figure shows, after the opacification of the stomach through the gastrostomy site, the evidence of a gastrocolic fistula.

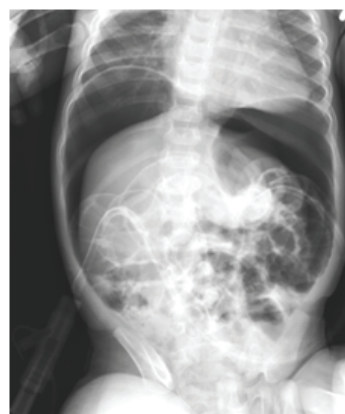


Figure 2: The radiogram performed on second day after PEG placement showed a massive pneumoperitoneum.



Figure 3: One of the minor complications is peristomal granuloma that can be removed in a day hospital setting

probably due to peritoneal irritation caused by contamination at the time of PEG insertion. Another possible complication is the failure of the stomach to adhere to the abdominal wall, because no sutures are placed at this site, may also result in intraperitoneal leakage and peritonitis. Also if some authors documented significant morbidity in their series and they stressed that PEG in pediatric patients should be considered a major surgical procedure, the majority of pediatric gastroenterologists and pediatric surgeons under-evaluate this procedure considering PEG a basic procedure with a low risk of complications [1]. Our experience confirms that complications can happen after PEG placement in about 20 % of cases and in about 5 % of cases they are major problems and they require a surgical procedure to solve them.

In particular it is important to underline that in both cases of major complications, in our series, the PEG positioning was absolutely normal and the complication was evident only some days after the procedure or in the second case only after PEG replacement. Minor complications are well known and they are linked to the management of the gastrostomy by the caregivers and they can be solved in the majority of cases in a day hospital setting. As for complications linked to PEG breakdown, we believe that they are due to the quality of the products, in fact there are high and low profile materials and in the international literature is reported that higher is the quality of material lower is the risk to have a PEG breakdown. On the basis of our experience and on the basis of the analysis of the literature it is

clear that major PEG's complications are linked to the blind part of the procedure when the needle is introduced transperietally, enter in the abdominal cavity before entering in the stomach when the gastroscope can view again it [9].

In our team with a strong experience in laparoscopic surgery in particular cases (e.g.: patients already operated, important spine deformity, baclofen pumps located in the abdominal wall, etc.) we performed a PEG under laparoscopic view, introducing a 5-mm laparoscope through the umbilicus to perform every part of the procedure under visual guide.

PEG positioning under laparoscopic vision remains a very safe procedure avoiding the blind part of PEG insertion, however it needs laparoscopic instruments and additional operative time to do it (about 15-20 minutes) and in addition we have to perform an additional hole in the umbilicus. Another weak point of the procedure is that few attentions are dedicated to the informed consent. As happens currently in pediatric surgery, for each procedure performed the surgeon asks to the parents to sign a well detailed informed consent.

As for PEG positioning, considering that it is considered a simple and a low risk procedure, in general pediatric gastroenterologists and/or pediatric surgeons ask to the parents to sign a generic informed consent (as for diagnostic endoscopy) without mentioning all the complications that can happen after the procedure.

As we already mentioned in the Methods section, the parents of 1 of our patient with a major complication, moved a legal action against the hospital to have a remboursement. According with the international literature we agree that the gold standard for gastrostomy positioning is the PEG, however complications can happen using this procedure and the parents have to know it before surgery and they have to sign a well structured informed consent. In case of particular patients (chest wall deformity, patients already operated) a laparoscopic control of the needle insertion seems safer than the blind placement of it. In conclusion, PEG placement is generally considered a minor and safe procedure. However, the incidence of complications after PEG placement, according with the literature reports, is variable between 10 and 20 %. In our experience we report 5 % of major complications that

required a redo surgery. It is important to write in the informed consent that complications after PEG placement are possible and sometimes a redo surgery is required. In one of our case a legal action was moved against the hospital.

Conflicts of Interest and Source of Funding

All authors declare that they have no conflict of interest or financial interests.

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