Gastrostomy Tube Replacement Using Foley's Catheters in Children

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Objective: *To study the complications from gastrostomy tube replacement using Foley's catheters.*
Material and Method: *This is a retrospective descriptive study that included children (aged 0-15 years), who had their gastrostomy tubes replaced during 1 October 2006 and 30 September 2011.*
Results: *There were 353 gastrostomy tube replacements in total. Majority of them were using Foley's catheters, 339 times in 28 children. In this group, 275 of them were performed as scheduled, mean while 64 were emergency events. The most frequent cause of the emergency replacement was the tube displacement, comprising 82.81% of all causes. Most events were usual replacements. Only one case required endoscopy with gastrostomy tract dilation under general anesthesia. Complications were found in 81.12%; the first and second most common found were dislodgement and granulation tissues, respectively. No severe complications were found.*
Conclusion: *The gastrostomy tube replacement using Foley's catheters instead of the commercial gastrostomy ones is a safe and convenient practice without any severe complications. However, further studies should be conducted in order to improve the skin fixation to prevent granulation tissue and the dislodgement.*

Keywords: *Gastrostomy tube replacement, Foley's catheter, Complications*

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A significant number of child patients, who have developmental, cerebral or gastrointestinal problems, need gastrostomy tubes[1] and tube replacement at a hospital numerous times. There are several methods and tube types for the replacement, depending on the care skills and ability and affordability.

At Thammasat University Hospital, most children rely on Foley's catheters instead of the commercial gastrostomy ones. This is a popular practice in Thailand and certain countries[2,3] although some of which only use Foley's catheters as temporary transcutaneous gastrostomy tubes[4,5].

The investigator, therefore, reviewed the use of the gastrostomy tube replacement (GTR) in children during a five-year period, focusing on the replacement method using Foley's catheters instead of the commercial gastrostomy type. The aim is to obtain information of possible complications compared with the previous studies, which only reported the complications in the commercial gastrostomy catheter or silicone type catheter replacement.

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Objective

To study complications of the gastrostomy tube replacement using Foley's catheters.

Material and Method

This five years retrospective study was conducted on patients aged 0-15 years, who had had their gastrostomy tubes replaced at Thammasat University Hospital during 1 October 2006 and 30 September 2011. Data were obtained from patient records for descriptive analysis. The present research project was approved by Human Research Ethics Sub-Committee 1 at the Faculty of Medicine under the project code MTU-EC-SU-6-044/55.

Results

Twenty-eight children had their gastrostomy tubes replaced at Thammasat University Hospital during 1 October 2006 and 30 September 2011. Among these patients, 17 were boys, and 11, girls. The average age when the gastrostomy tube placement was first performed ranged from 2 years and 6 months and from 3 months to 10 years and 2 months. Eleven of

these children were infants. Disorders that were indicated for the gastrostomy tubes placement were neuromuscular disorders (epilepsy, cerebral palsy, epidural hematoma, brain tumor), congenital cardiac anomalies, and swallowing problems in 20, 4 and 4 patients (71.43%, 14.29% and 14.29%), respectively, as shown in Table 1.

There were 353 GTR in total; 284 of which were as scheduled, and 69 were emergency events, the latter represents 20% of GTR at the Hospital. Of the total 353 events, a majority of them (339 events) used 16 Fr. or 18 Fr. Foley's catheters which were scheduled to be performed every 6-10 weeks. Scheduled replacement was 275 events (81.12%). The present study had no percutaneous endoscopic gastrostomy (PEG) tube replacement.

The incidence of complications that prompted for the emergency GTR was at 18.88%. The cause of the emergency replacement was tube displacement in 53 events or 82.8% of all causes, as demonstrated in Table 2. All events were using standard techniques of replacement except for only one case of a one-year-old girl, who required endoscopy with gastrostomy tract dilation under general anesthesia. She had had gastrostomy tube placement for four months prior to the catheter displacement. On arrival after eight hours of the displacement, her gastrostomy tract was stenosis, which required endoscopy and dilation. Feeding via gastrostomy was possible within 24 hours after the surgery without complications.

From 275 GTR, 211 complications were found. The summary of 275 events of complications from the total 339, including scheduled and emergency replacements, was equal to 81.12%. Nevertheless, the majority of complications were from dislodgement.

In case of dislodgement, the sliding distance ranged from 2 cm. to 15 cm. without any symptoms of the distal stomach obstruction. Some patients had severe vomiting following eating full consumption of their diet, but spontaneously recovered when their tubes were repositioned. This problem was corrected by teaching the parents how to examine tube length and the proper fixation.

Table 1. Demographics data

Parameter	n	%
Sex		
Boys	17	60.71
Girls	11	39.29
Timing for gastrostomy tube placement		
Infant	11	39.29
>1-15 years	17	60.71
Underlying disease		
Neuromuscular disorders	20	71.43
Congenital heart diseases	4	14.29
Swallowing problems	4	14.29
Type of gastrostomy tube for replacement		
Foley's catheter	339 times	96
Commercial gastrostomy tube	8 times	2.3
Skin-level gastrostomy tube	6 times	1.7

Table 2. Complication of GTR

Complication	Emergency GTR (times)	Schedule GTR (times)	Total (times)
Displacement	53	-	53
Dislodgement	5	111	116
Granulation	-	84	84
Obstruction	6	-	6
Leakage	-	16	16
Total	64/64 (100%)	211/275 (76.72%)	275/339 (81.12%)

Discussion

The GTR using an apparatus with balloon-type fixation is easy and causes few major complications. The examination to confirm that the tips of gastrostomy tube really are inside the stomach is crucial. Several studies have investigated a lot of methods to assure the proper location of the tube tips such as x-ray fluoroscopy, injection of contrast agents into the stomach[6], x-ray fluoroscopy combined with air blowing into the stomach[7], ultrasonography to determine the balloon shadow in the stomach[8,9], injection of pigments into the stomach and drawing them after the tube replacement[10] as well as invention of a metal-sheet device to insert in the abdominal opening prior to the new tube replacement[11]. The technique of transcutaneous gastrostomy tube replacement in the present study was simple without the need for determining the tube location with any special devices or procedures. Three types of observation were used: 1) abdominal wall movement when the tube was lifted, 2) free rotation of the tube and 3) suction of digestive juice or food remnants. The present study found no abnormal tube location after

the replacement.

The patients in the present study, who needed the emergency tube replacement, were mostly because of tube displacement and water balloon rupture or leakage. Most cases were corrected by a new tube replacement. However, in cases in which the tubes had been displaced for a long time, the gastrostomy tract became impatent, and new tubes, even smaller ones, could not be inserted. The present study used endoscopy to evaluate the gastric openings, Hegar's dilator was used to dilate the gastrostomy tract then 16 Fr. Foley's catheters could be inserted. There was a study with a similar approach using Seldinger technique with a metal introduction wire followed by a plastic dilator and gastroscopic guidance[12]. Hegar's dilator was also reported to be used in another study[13].

Of all complications observed, dislodgement and granulation tissues were the first and the second most common. A study by Kurien et al reported the granulation tissues to be the most found complication from the gastrostomy at 27%[14]. Although no severe complications arose from the dislodgement in the present study, prophylaxis should be considered. Because when the tubes slide further in the stomach, the balloons will be pulled down at the gastric sphincter, which may lead to gastric obstruction[4]. Reverse intestinal intussusception has been reported as a result of the gastrostomy tubes sliding, into the duodenum[15,16]. Pancreatitis has been reported, secondary to the tube sliding into the duodenum, resulting in obstruction of the pancreatic and biliary tract[17,18]. The sliding-in and -out of the tubes resulted in an irritation of gastrostomy tract and eventually caused the granulation tissue. Furthermore, wider openings with leakage may occur around the feeding tubes and also result in chemical dermatitis.

From the present study, it may be conclude that Foley's catheters can be used instead of the commercial gastrostomy with neither replacement problems nor severe complications detected. The patients, however, have to have their Foley's catheters replaced approximately every eight weeks as compared to the commercial gastrostomy tube that can last for at least six months. Frequent visits to the hospital are troublesome, particularly while this patient group usually has cerebral palsy, appendage spasm, inability to walk or handle themselves and, at older ages, significant body length and weight. Their caregivers usually are grandparents, who are also aged and find it inconvenient to bring the patients to the hospital. Most caregivers depend on car rental or relatives' car with limitation of availability. Considering total expenses, the rental or transportation charges may be higher than what the commercial feeding tubes cost.

Conclusion

The substitution of the commercial gastrostomy catheters with Foley's catheters is practical and can reduce costs. The replacement is a simple procedure. Studies should, however, be conducted to 1) develop fixation approaches for Foley's catheters to the skin to prevent the sliding-in of the tubes. 2) determine whether a removal of urinary catheter tips is beneficial or results in any complications. 3) extend the interval between replacement visits or to switch to silicon-type catheters in order to decrease the number of visits.

What is already known on this topic?

Complications from commercial gastrostomy tube replacement are worldwide public.

Silicone Foley catheter can be safely used as a replacement gastrostomy tube; it is considerably cheaper than the commercial replacement gastrostomy tube, and its efficacy and complication rates are similar to those of the commercial replacement gastrostomy tube.

What does this study add?

The investigator reviewed the transcutaneous tube replacements in child patients, specifically focusing on the replacement using Silicone coated latex Foley catheters instead of the commercial gastrostomy ones, to obtain information as regards the complications as previous studies had only mentioned complications from the commercial gastrostomy catheter replacement.

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Potential conflicts of interest

None.

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การเปลี่ยนสายให้อาหารทางหน้าท้องของผู้ป่วยเด็กโดยการใช้สายสวนปัสสาวะ

ศิริภัทร เกียรติพันธุ์สดใส

วัตถุประสงค์: *ศึกษาการเปลี่ยนสายให้อาหารทาง6หน้าท้องโดยการใช้สายสวนปัสสาวะ*

วัสดุและวิธีการ: *เก็บข้อมูลย้อนหลังเชิงพรรณนาผู้ป่วยเด็ก (0-15 ปี) ซึ่งได้รับการเปลี่ยนสายให้อาหารทางหน้าท้องในช่วงเวลา 1 ตุลาคม พ.ศ. 2549 ถึง 30 กันยายน พ.ศ. 2554*

ผลการศึกษา: *มีการเปลี่ยนสายให้อาหารทางหน้าท้องทั้งสิ้น 353 ครั้ง เปลี่ยนโดยใช้สายสวนปัสสาวะ 339 ครั้ง จากผู้ป่วย 28 คน เป็นการเปลี่ยนตามกำหนด 275 ครั้ง และแบบฉุกเฉิน 64 ครั้ง สาเหตุที่ทำให้ต้องเปลี่ยนสายแบบฉุกเฉินมากที่สุดคือจากการเลื่อนหลุดคิดเป็นร้อยละ 82.81 ของสาเหตุทั้งหมดส่วนใหญ่สามารถเปลี่ยนตามปกติได้มีเพียง 1 รายที่ต้องเปลี่ยนโดยการส่องกล้องทางเดินอาหารและขยายช่องสายให้อาหารภายใต้การดมยาสลบ ภาวะแทรกซ้อนรวมทั้งหมดพบร้อยละ 81.12 ส่วนใหญ่ คือ สายเลื่อนเข้าและรองลงไปคือเนื้อเยื่อแกรนูเลชั่นแต่ไม่พบภาวะแทรกซ้อนที่รุนแรง*

สรุป: *การใช้สายสวนปัสสาวะทดแทนสายให้อาหารทางหน้าท้องเชิงพาณิชย์เป็นสิ่งที่ทำได้ สะดวกและปลอดภัย ไม่พบภาวะแทรกซ้อนที่รุนแรง อย่างไรก็ตามควรมีการศึกษาเพื่อพัฒนาการยึดตรึงสายสวนปัสสาวะกับผิวหนัง เพื่อป้องการการเลื่อนเข้าของสายและการเกิดเนื้อเยื่อแกรนูเลชั่น*