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Impact of the new payment system on laparoscopic appendectomy in Korea

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ABSTRACT

Background: Korea has a nationalized health system. The aim of this study was to evaluate the impact of the Korea diagnosis related group–based prospective payment system (K-DRG/PPS) on the use of medical resources and the rate of adverse events during laparoscopic appendectomy.

Methods: We included patients who underwent laparoscopic appendectomy at Dongtan Sacred Heart Hospital, Korea, between November 2012 and February 2014. The patients were divided into two groups: before-DRG/PPS or after-DRG/PPS groups. The length of the postoperative hospital stay (LOS) and medical costs were indicators of the medical resources. Medical costs included those of the initial hospital stay, outpatient clinic, readmission, and the sum of these charges. Complication and readmission rates were indicators of the rates of adverse events.

Results: After the implementation of the DRG/PPS, length of the hospital stay decreased by 10% (4.9 d before *versus* 4.4 d after DRG/PPS; $P < 0.001$). The initial hospital stay and total cost were significantly lower in the after-DRG/PPS group (both $P < 0.001$). The complication rates during the initial hospital stay (3.5% before *versus* 2.3% after DRG/PPS; $P = 0.225$) and the readmission rates (4.3% *versus* 2.5%, respectively; $P = 0.227$) were statistically similar.

Conclusions: This study shows that the K-DRG/PPS for laparoscopic appendectomy had no negative effect on the rate of adverse events and reduced the use of medical resources. Further evaluation of other procedures is required to determine the overall effects of the K-DRG/PPS.

1. Introduction

Expenditure on medical care has increased over time in most countries [1]. Therefore, controlling costs without compromising the quality of health care or patient safety is one of the major concerns of governments. The concept of the diagnosis related group (DRG) classification, a clinically meaningful classification that defines patient groups according to similar resource consumptions, was outlined at Yale University in 1975 [2,3] and a DRG-based prospective payment system (PPS) was implemented in the United States for the first time in 1983 [4]. DRG-based reimbursement refers to a fixed-rate payment system for each hospital stay based on the DRG. Since its implementation, several other countries have adopted DRG-based PPS-like systems [5–10].

Previous studies have shown that the DRG-based payment system reduces the length of the hospital stay (LOS) and thereby reduces the total cost of hospital care [11–13].

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However, under this payment system, hospitals may reduce the resources used for patient care and compromise the quality of medical care. Several studies have reported increased readmission rates after the implementation of DRG payments, although hospital mortality rates did not increase (9, 10). In contrast, other studies have shown that readmission and mortality rates remained unchanged after the introduction of DRG-based PPS-like systems [14,15].

The Korean government launched social insurance for health care in 1977 and achieved universal coverage of the population in 1989. Before 2000, the Korean national health insurance system consisted of more than 350 health insurance societies covering specific workplaces or regions. The insurance contributions in workplace schemes are proportional to the individual's income and are equally shared by the employee and employer. In region schemes, the government provides a subsidy to self-employed individuals for the insurance contributions. In 2000, however, the health insurance societies started to merge. The Korean government has reimbursed health care providers in a fee-for-service system since the start of the national health insurance scheme. Under this system, the medical providers tend to increase the volume and intensity of the medical resources used and substitute uninsured services to avoid governmental regulation of fees. These changes have substantially increased national health expenditure. The average annual rates of increase in expenditure for drugs and medical supplies were 11.43% and 13.57%, respectively. Both exceeded the average annual rate of increase in total medical expenditure, which is 8.2% [16].

To control health expenditure, the Korean government tested three DRG pilot programs for 3 y, from 1997–2000. On average, the pilot programs showed reductions in medical care costs and LOS of 8.3% and 3.0%, respectively [16]. The Korean DRG/PPS (K-DRG/PPS) was compulsorily implemented to all hospitals in 2013 for seven disease categories and inpatient care. Although the K-DRG/PPS is based on the Yale Refined DRG system, it differs from the DRG-based payment systems in the United States. The K-DRG/PPS covers all medical expenses, except for sonograms, magnetic resolution imaging, meals, surcharge for the patient's choice of doctor, and extra charges for rooms shared by fewer than six persons. As another difference, the United States government reimburses hospitals using DRG-based prospective payments and physicians according to resource-based relative values, in which the relative fees of physicians are based on resource costs. By contrast, the Korean government combines the fees for the provider and hospital into a single PPS.

Appendectomy is one of the seven disease categories in the K-DRG/PPS, and laparoscopic appendectomy has been widely used in Korea since its first report by Semm (1983) [17]. However, whether the K-DRG/PPS will affect medical costs and the rate of adverse event after its introduction to all hospitals is still unclear.

The purpose of this study was to evaluate the impact of the K-DRG/PPS on the use of medical resources and the rate of adverse events for patients undergoing laparoscopic appendectomy in Korea. Our hypotheses are that the K-DRG/PPS has prompted physicians to provide fewer medical services and discharge patients earlier than before this system was implemented, resulting in increases in the complication rate, readmission rate, and the cost of outpatient care, despite decreases in medical resources and hospital stay.

2. Materials and methods

We included all patients who underwent laparoscopic appendectomy at Dongtan Sacred Heart Hospital, Republic of Korea, between 1 November 2012 and 28 February 2014. Our institution is a university-affiliated hospital that is a referral center for secondary treatment, including outpatient clinics and an emergency department. Laparoscopic appendectomy was defined according to the K-DRG (G08300, G08301, G08302, G08400, G08401, and G08402). We selected laparoscopic appendectomy for this analysis because it is performed widely in Korea and about 95% of appendectomies in our hospitals are laparoscopic. Open appendectomy was more frequently performed before implementation of the K-DRG/PPS because one surgeon mainly performed open surgery and then switched to laparoscopic surgery. The exclusion criteria were open appendectomy, incidental appendectomy, pregnant women who underwent appendectomy, and colon resection (right hemicolectomy, ileocecectomy, or cecectomy).

The patients were divided into two groups according to heir admission dates: the before-DRG/PPS group and the after-DRG/PPS group. The DRG-based payment system was introduced to all hospitals in Korea on July 1, 2013. Therefore, retrospective data for patients who had undergone laparoscopic appendectomy between November 1, 2012 and June 30, 2013 (the before-DRG/PPS group) were compared with prospectively collected data for patients treated between July 1, 2013 and February 28, 2014 (the after-DRG/PPS group).

The study was approved by the Institutional Review Board of Dongtan Sacred Heart Hospital (IRB number, 2013-111).

2.1. *Patient management*

Initial hospital stay was defined as the period of admission for laparoscopic appendectomy. The diagnosis of acute appendicitis was based on the patient's history, a physical examination, and computed tomography (CT) or ultrasonography. In cases of negative CT findings and highly suspicious signs, ultrasonography was considered for further evaluation. CT was also considered in cases of negative ultrasonography findings.

After diagnosis, laparoscopic appendectomy was performed with a three-port technique, placing one 10-mm port in the umbilicus, and two 5-mm ports in the left lower quadrant and the suprapubic site. The mesoappendix was identified and resected using clips or cautery. The appendix was secured at its base with Endoloops (Ethicon, Cincinnati, OH) and resected. The specimen was removed via the umbilical trocar site with an endopouch (SEJONG MEDICAL, Paju, Korea). A pelvic drain was inserted through the lower midline port site under direct vision in cases of perforation or periappendiceal abscess.

After surgery, water intake was commenced when the patient showed evidence of bowel function. A soft diet was begun when the patient tolerated water. The Jackson–Pratt drain was removed immediately after the patient had no fever and no pus-like discharge between postoperative day 3 and