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SHORT COMMUNICATION

# Specialized operating room for cesarean section in the perinatal care unit: a review of the opening process and operating room management

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**Abstract** We have opened an operating room in the perinatal care unit (PNCU), separate from our existing central operating rooms, to be used exclusively for cesarean sections. The purpose is to meet the increasing need for both emergency cesarean sections and non-obstetric surgeries. It is equipped with the same surgical instruments, anesthesia machine, monitoring system, rapid infusion system and airway devices as the central operating rooms. An anesthesiologist and a nurse from the central operating rooms trained the nurses working in the new operating room, and discussed solutions to numerous problems that arose before and after its opening. Currently most of the elective and emergency cesarean sections carried out during the daytime on weekdays are performed in the PNCU operating room. A total of 328 and 347 cesarean sections were performed in our hospital during 2011 and 2012, respectively, of which 192 (55.5 %) and 254 (73.2 %) were performed in the PNCU operating room. The mean occupancy rate of the central operating rooms also increased from 81 % in 2011 to 90 % in 2012. The PNCU operating room was built with the support of motivated personnel and multidisciplinary teamwork, and has been found to be beneficial for both surgeons and anesthesiologists, while it also contributes to hospital revenue.

**Keywords** Cesarean section · Operating room · Perinatal care unit · Occupancy rate

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## Introduction

In North America and in several European countries, obstetric surgery is routinely performed in an operating room with special facilities such as a delivery suite and perinatal care unit (PNCU) where anesthesia is provided by obstetric anesthesiologists. In Japan, however, operating rooms are rarely provided in a PNCU even in large-scale hospitals and few anesthesiologists are specialized for obstetric anesthesia. The background to this situation is that delivery has long been managed by midwives at home or in small-scale birth centers, not in hospitals. Almost half the number of total deliveries in Japan is still performed in small-scale private clinics, as shown by the limited average number of deliveries in each general hospital of approximately 400 per year.[1]

About 60 % of anesthesia for cesarean sections in Japan is managed by obstetricians, not by anesthesiologists [1], and regional anesthesia is rarely performed for labor delivery, as the number of anesthesiologists in Japan is much smaller than in some European and American countries. As a result, a large number of Japanese anesthesiologists are unfamiliar with obstetric procedures. Large-scale hospitals with a PNCU admit and treat numerous parturients with various maternal and fetal complications, with anesthesiologists performing anesthesia for various surgical procedures including cesarean sections. The parturients often require emergency cesarean section, and shortening the interval from the decision for a cesarean section to delivery is essential for decreasing neonatal and maternal mortality. The consensus is that emergency cesarean sections should be performed within a

[1] http://www.mhlw.go.jp/toukei/saikin/hw/hoken/national/dl/22-03.pdf, accessed May 3, 2014.

decision-to-delivery time of 30 min [2]. Medical staff including obstetricians, anesthesiologists and nurses in such hospitals are therefore required to be prepared for emergency cesarean sections at any time, regardless of the numerous non-obstetric surgeries being performed.

Despite such challenging conditions, limiting the number of surgeries to maintain an operating room open and prepared for unpredictable emergency cesarean section is not practical with regard to productivity and efficiency, as operating rooms incur a considerable amount of hospital revenue [3]. We built an operating room as part of the PNCU to be used exclusively for cesarean sections in order to meet the increasing need for both emergency cesarean sections and non-obstetric surgery. It was built separately from the central operating rooms in order to perform emergency cesarean sections when all the central operating rooms are occupied, and with the possibility that those operating rooms might be expanded for non-obstetric surgery. Here, we report the process of building the PNCU operating room, and present the number of surgeries performed in the central and PNCU operating rooms, along with the occupancy rates in the central operating rooms. Use of de-identified registry data was approved, and the requirement for written informed consent was waived for this study by the Osaka City General Hospital Ethics Committee, Osaka, Japan (No. 1312069, 25 Dec 2013).

Our hospital is a municipal, tertiary care medical center with 1,063 beds and an emergency department, and receives patients 24 h per day. It also plays an important role as a perinatal medical center, receiving parturients with severe maternal and fetal complications and neonates requiring intensive care. Of the 7,295 patients who underwent anesthesia performed by anesthesiologists in the hospital in 2013, 1,160 underwent emergency surgery, and 237 and 172 parturients had elective and emergency cesarean section, respectively. Faced with a rapid increase in the number of both elective and emergency surgeries, improving productivity and efficiency while maintaining high quality of care at all times has been a goal of our operating room management. Therefore, we have been trying to minimize turnover time, defined as time from departure of a patient from an operating room to entry of the next patient [4], in order to increase the number of surgeries [5]. On the other hand, we have to be prepared for emergency cesarean section at all times. These conditions prompted us to build an operating room to be used exclusively for cesarean sections.

Part of the PNCU located on the ninth floor next to the neonatal intensive care unit in our hospital (on the same floor as the maternity ward) was converted into an operating room (approximately 30 $m^2$) in late 2010. It is equipped with the same surgical instruments, anesthesia machine, monitoring system, rapid infusion system and airway devices as well as anesthetics and other agents as found in the central operating rooms on the third floor of the same building. We provide anesthesia for both elective and emergency cesarean sections in this operating room during daytime hours with the exception of holidays. The total number of surgeries under general or neuraxial anesthesia administered by anesthesiologists at our hospital in 2011 and 2012 was 6,601 and 6,938, respectively, while the total number of cesarean sections was 328 and 347, of which 192 (55.5 %) and 254 (73.2 %) were performed in the PNCU operating room. Furthermore, the mean occupancy rates of the central operating rooms calculated as the duration of time with patients in the operating room divided by 8 h and 15 min (from 9:00 am to 5:15 pm), excluding 30 min between surgeries for room preparation, were 81 and 90 %, in 2011 and 2012, respectively. There were 26 cases of cesarean section performed under general anesthesia, one case of unexpected massive hemorrhage and one case of unexpected placenta accreta in the PNCU operating room during those 2 years, each of which was treated uneventfully.

Few hospitals in Japan have dedicated operating rooms for cesarean section where anesthesiologists usually work independently from others in the same institution. In sharp contrast, all anesthesiologists at our hospital belong to the same department, share information about patients including parturients and perform anesthesia for all types of surgery. We found it beneficial for both the hospital and the medical staff to have a PNCU operating room for various reasons. First, newborns, particularly those with a very low birth weight and tracheal intubation, can be transferred to the neonatal intensive care unit after birth more easily and safely than to the central operating rooms. Furthermore, parturients are easily transported to and from this operating room without the emotional stress caused by transportation over a long distance to and from the central operating rooms. Finally, preparation of the central operating rooms for emergency cesarean section is no longer necessary and non-obstetric surgery can be performed without considering the possibility of an emergency situation. This has resulted in an increase in the number of surgeries performed in the central operating rooms, higher occupancy rates than before full opening of the PNCU operating room, and a contribution to hospital revenue.

Numerous problems and dynamic changes in the current existing medical system of our hospital had to be addressed before opening a new operating room. To preparing for its opening, a leading anesthesiologist and an experienced nurse in the central operating room worked together to train nurses in the PNCU in basic knowledge and nursing techniques related to cesarean section. The nurse also trained them in the central operating room for two weeks. The leading anesthesiologist began performing anesthesia

in the PNCU operating room assisted by the experienced nurse. During this time, several meetings with obstetricians, the head of our department and nurses from the central and PNCU operating rooms were held to ensure all necessary requirements were met and to finalize details regarding the nursing protocol. Other anesthesiologists began performing anesthesia in the PNCU operating room with assistance from the leading anesthesiologist 2 months later. However, at that time, the new operating room was only open 2 days a week and emergency cesarean sections were still performed in the central operating room, requiring one operating room to be prepared for emergencies at all time. We started providing anesthesia for both elective and emergency cesarean sections during daytime hours, with the exception of holidays, in the PNCU operating room in 2012.

Anesthesiologists working in this new facility are required to have adequate experience to independently perform anesthesia safely, as it is located at a distance from the central operating rooms where most of the anesthesiologists work and immediate assistance is not available. To avoid these risk factors, cesarean sections with a possibility of massive hemorrhage due to total placenta previa and requiring two or more anesthesiologists are still performed in the central operating rooms.

To our regret, we are not able to compare relevant data with data before 2011 because of a lack of records. The major limitation with our PNCU operating room is that it is not open 24 h per day because of manpower shortage. This would be fully realized with adequate staffing, which suggests that we are not yet fully enjoying all of its advantages. It is our goal to keep the operating room open 24 h per day in the near future. However, this operating room has made the transport of parturients and newborns easier and faster compared to before its opening. In countries other than Japan, where obstetric anesthesiologists cannot be independent from general anesthesiologists and maternity hospitals are not centralized, it is possible that hospitals would obtain some benefits by establishing an operating room in the PNCU.

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