



Historical vignette

Morio Kasai: a remarkable impact beyond the Kasai procedure

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Received 12 December 2011; accepted 18 January 2012

Key words:

Kasai procedure;
Biliary atresia

Abstract Morio Kasai is one of the most influential Japanese pediatric surgeons. He is best recognized in the United States for his pioneering efforts in the field of biliary atresia. His work revolutionized the treatment of infants born with biliary atresia throughout the world. Less is known about his remarkable impact in the fields of general surgery and pediatric surgery. This review highlights some of Dr Kasai's major contributions and highlights the influence he had in the establishment of pediatric surgery as a field.

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Surgical leaders in the United States are generally well known, and their stories are often told to generations of young surgeons during training. The recent history of surgical progress and development outside the United States is not as well publicized. Morio Kasai (1922–2008) is considered one of the greatest innovators in the field of pediatric surgery (Fig. 1) [1]. He was a very modest Japanese man about whom little is known in the western hemisphere beyond the operation that bears his name. In Japan, he is considered one of the early surgeon-scientists who was also appreciated by many as an exemplary teacher and role model. During the 1950s, as Japan was rebuilding after the destruction it sustained in World War II, Dr Kasai emerged as an early proponent of clinical research in surgery, especially in pediatric surgery. Much as Drs Gross [2] and Ladd

[3] did in the United States, he was instrumental in establishing pediatric surgery as a distinct surgical specialty in Japan. His revolutionary and extensive work in the area of biliary atresia has proven to be one of the most significant advances in pediatric surgery in the last century and opened the eyes of American surgeons. He is best known for the development of the procedure that bears his name, the hepatic portoenterostomy or the Kasai procedure for treatment of biliary atresia in infancy. A monumental accomplishment in its own right, it remains only a partial element of his complete legacy. Throughout his life, Dr Kasai remained actively involved in the world of pediatric surgery, which he helped to develop until he died on September 29, 2008, at the age of 86. The goal of this review, which has not been easy because of his modesty, is to detail Morio Kasai's varied contributions to the development of the field of pediatric surgery.

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¹ Alejandro Garcia was a recipient of a T32 training grant (HL007343) from the NIH.

1. Education, professional, and personal life

Dr Kasai was born in 1922, in Aomori Prefecture, the northernmost prefecture of the mainland of Japan, far from



Fig. 1 Portrait of Morio Kasai, MD.

Tokyo, the longstanding center of medical and political life in Japan. He began his medical studies in Sendai at the end of World War II, during a time of economic hardship and social changes in Japan. He graduated from the National Tohoku University School of Medicine in 1947 and remained at Tohoku University for his surgical training and then joined what was known as the second department of surgery at that institution. He began his career as a general surgeon, at a time before pediatric surgery had been recognized as a separate specialty in Japan. At Tohoku University School of Medicine, Dr Kasai and his colleagues were involved in diverse research efforts in the fields of surgical oncology, esophageal surgery, and pediatric surgery. He was a strong proponent of the surgeon-scientist model, which just began to be encouraged in the United States and in some surgical training programs in parts of Western Europe. His early work focused on water and electrolyte metabolism in surgical patients with particular attention to postoperative fluid therapy in children [4]. During this time, similar research was ongoing at the Peter Bent Brigham Hospital in Boston under the direction of Dr Francis D Moore. This work led to the first major book on fluid management in postsurgical patients, "The Metabolic Care of the Surgical Patient," published by the Boston group in 1959 [5].

In 1959, Dr Kasai completed a 1-year research fellowship with Charles Everett Koop, MD, the surgeon-in-chief at the Children's Hospital of Philadelphia. His experience in Philadelphia led to this young surgeon's lifelong dedication to the surgery of children. Upon his return from Philadelphia, Dr Kasai was promoted to Associate Professor of Surgery at

Tohoku University and in 1963, at 41 years of age, he became professor and chief of the second department of surgery and continued in this role until he was forced to retire from the university by academic regulations at 63 years old, as are most professors at academic centers in Japan. As chairman, Dr Kasai led his department in many innovations, which are listed briefly later in this brief biography, including, especially, the development of the field of pediatric surgery. During his tenure, he trained four pediatric surgeons who carried his ideas and methods to all corners of Japan by disseminating his expertise in the surgical care of infants and children. He also helped Dr Koop establish a biliary atresia program at the Children's Hospital of Philadelphia in the 1970s. Upon his retirement in 1986, Dr Kasai became the emeritus professor at National Tohoku University and, soon after that, the director of NTT Tohoku Hospital, where he worked until his retirement in 1993. He continued to influence surgery, especially pediatric surgery until his death, even after being hampered by a stroke in 1999.

Dr Kasai was also well recognized by his contemporaries for his activities outside the biomedical world. He was known for being an avid skier and a mountain climber. In 1986, he headed the Tohoku University mountain-climbing team, which was the first in the world to successfully climb the Nyainquntanglha Mountains, the highest mountains in Tibet. He was well known by his colleagues as highly sociable, particularly when sharing sake among friends [1,6].

2. The Kasai procedure

Dr Kasai's reputation in the western hemisphere has been based primarily on his many contributions to the knowledge and therapeutic advancements in the area of biliary atresia, improving the care and outcomes for children afflicted with this rare disorder. Biliary atresia is a serious condition affecting infants with an incidence of 1 in 15,000 live births and is the most common surgical cause of neonatal jaundice [7]. It is characterized by an obliterative cholangiopathy that affects all or part of the extrahepatic biliary tree. In the 1950s, the condition was considered fatal in practically all cases. Dr Kasai's efforts to understand the pathologic processes that lead to biliary atresia, cholestasis, and eventual cirrhosis, paved the way for the surgical intervention that he developed. He is appropriately credited for his original contributions to the development of the hepatic portoenterostomy technique, aptly known as the Kasai procedure. In 1955, he performed the first Kasai procedure in a 72-day-old infant who was diagnosed with biliary atresia. During the procedure, Dr Kasai noted no evidence of extrahepatic bile ducts and, after further dissection, encountered significant bleeding. In an attempt to achieve hemostasis, he is purported to have placed the duodenum over the porta hepatis in the incised region where the bleeding appeared to originate. All were astonished at the appearance of bile

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