

Incidence of Wound Infection in Orthopaedic Same Day Surgery and its Financial Implication*

M. Ahmad Djojosugito**

Abstrak

Bedah rawat jalan dilaksanakan di RS Hasan Sadikin (RSHS)/ Fakultas Kedokteran UNPAD (FKUP) sejak 1987-1988. Kebijakan yang dimaksudkan untuk penghematan biaya perawatan rumah sakit tanpa mengurangi kualitas pelayanannya, kemudian dilaksanakan oleh para ahli bedah FKUP/RSHS terhadap pasien pribadi mereka di RSHS dan dua RS swasta lain di Bandung. Penelitian ini adalah penelitian observasional dengan menggunakan metode epidemiologi deskriptif, yang dilakukan pada kohort pasien-pasien pribadi bedah orthopaedi rawat jalan yang dilaksanakan oleh penulis di tiga rumah sakit di atas. Tujuan penelitian adalah untuk mengetahui dampak bedah rawat jalan terhadap kualitas pembedahan (dalam bentuk insidensi kejadian infeksi luka operasi) dan terhadap biaya perawatan rumah sakit (dalam bentuk lama hari rawat). Kriteria inklusi ke dalam kohort adalah : luka operasi bersih, tidak digunakan drain pasca bedah, lama operasi diperkirakan kurang dari dua jam dan pemberian antibiotika profilaksis. Kohort ini dibandingkan dengan kohort bedah orthopaedi rawat inap yang dilakukan oleh penulis di rumah sakit yang sama dan memenuhi kriteria inklusi yang sama, yang dilaksanakan sebelum adanya kebijakan bedah rawat jalan. Hasil penelitian menunjukkan bahwa kejadian ILO pada 103 kasus bedah rawat jalan adalah 2.9%, lebih rendah dari kejadian ILO pada 87 kasus bedah rawat nginap yang besarnya 6.9%. Juga penelitian menunjukkan bahwa didapat penghematan hari rawat sebesar 2.1 hari pada bedah rawat jalan, atau 2.5 hari pada bedah rawat jalan pada tulang, atau 3.1 hari pada pembedahan pemasangan fiksasi interna pada tulang. Hasil penelitian yang menunjukkan bahwa penghematan dalam bentuk berkurangnya masa rawat pasca bedah tanpa menurunkan kualitas perawatan (yaitu berupa turunnya kejadian ILO) ini membutuhkan konfirmasi lebih lanjut melalui penelitian epidemiologis yang tidak menggunakan metode perbandingan historikal.

Abstract

"Same day surgery" (which means, the surgery which is done using outpatient setting and procedures, so that the patients have to be in the hospital for maximally 24 hours) was implemented in Dr. Hasan Sadikin Hospital (RSHS)/ Faculty of Medicine Padjadjaran University (FKUP) since 1987-1988. The concept which was aimed to reduce the cost of hospitalization while maintaining the quality of care, was then implemented by surgeons of RSHS/FKUP to their private patients in RSHS and two other private hospitals. This study is an observational study, using a descriptive epidemiologic method to identify the impact of same day surgery policy on the quality of operative care (in term of the incidence of postoperative wound infection / POWI) and on the cost of hospitalization (in term of the average length of stay / LOS). The study cohort were the same day orthopaedic surgery done to the private patients in RSHS and two other private hospitals during 1989. The criteria for inclusion in the cohort were : clean surgical wound, duration of surgical procedure less than two hours, no postoperative drainage tubing were used, prophylactic antibiotic were given. The cohort for comparison was the inpatient orthopaedic operations which were done by the same surgeon in the same hospital before the policy of same day surgery was implemented, and which matched with the inclusion criteria in the study cohort. The result showed the incidence of POWI among the 103 cases of same day orthopaedic surgery was 2.9%. The incidence was lower than the incidence of POWI among 87 cases of inpatient orthopaedic surgery, which were 6.9%. The LOS which were saved by the same day orthopaedic surgery were 2.1 days, or 2.5 days for same day bone surgery, or 3.1 days for same day bone internal fixation. The study also showed good saving of LOS without lowering the quality of care. Difference in the study periods have to be considered in making more valid conclusions and therefore further analytic epidemiologic study should be performed.

Keywords : Orthopaedic wound infection, same-day-surgery

* Presented at : The First International Conference on Same Day Surgery, Perth, Western Australia, 27 - 30 October 1993

** Dr. Cipto Mangunkusumo Hospital, Jakarta, Indonesia

INTRODUCTION

Since the introduction of the concept of same day surgery in Indonesia in 1986, same day surgery was implemented by Hasan Sadikin Public Hospital (RSHS) / Faculty of Medicine University of Padjadjaran (FKUP) in 1987/1988 followed by surgeons of RSHS in several private hospitals. In 1985/1986 the concept of nosocomial infection control and quality assurance was also introduced, and several programs concerning those concepts were started. To measure the quality of patient care in relation with quality assurance program, several criteria were used. To identify the impact of same day surgery procedures on the quality of patient care, the incidence of postoperative wound infection was used as one of the criteria of the quality of patient care. To measure the cost of surgical patient care, the postoperative length of stay was used as the measurement of the cost of hospitalization.

This paper is a review on the same day orthopaedic operations done by the author in the public and some private hospitals in Bandung, which evaluate the impact of same day surgery on the incidence of wound infection and on the reduction of the postoperative length of stay.

MATERIALS AND METHODS

The studied population were the same day orthopaedic operations done by the author in 1989 in Hasan Sadikin Hospital and two other private hospitals and which were followed up by the author. The study was a descriptive epidemiologic study, measuring the incidence of postoperative wound infection among the studied cases.

The same day surgery procedure were implemented in operations with clean wound, with estimated operation time of less than 2 hours, which didn't use drainage tubing postoperatively and to all cases were given one prophylactic antibiotic injection one hour before the operation. Cases with metal implant were given oral antibiotic postoperatively for three days. The follow up was done in out patient office on day three up to day 28 postoperatively.

Comparisons were done by reviewing the in-patient orthopaedic operations done by the same surgeon during one year prior to 1989 in the same hospitals, which matched with the same criteria for doing same day surgery procedure namely : clean

wound, duration of operation less than two hours, no drainage tubing postoperatively and administration of preoperative prophylactic antibiotics.

To identify the quality of patient care in term of postoperative wound infection, the 1988 CDC criteria for wound infection and the Committee on Infections of the American College of Surgeons wound classification were used. To identify and to quantify the financial impact of postoperative wound infection, the postoperative length of stay of the in-patient cases as compared with the length of stay of the same-day surgery cases (which is zero), was used as the measurement.

RESULTS

During 1989, one hundred and three orthopaedic operations were performed as the same day procedures. The age ranged from eight to 59 years old, with the median of 34 years. The cases were predominantly male (62 out of 103). The surgery were performed on bone (mostly bone internal fixation and orthopaedic implant removal) in 51 cases, and on soft tissue (tendon, joint, skin) in 52 cases.

During 1988, eighty seven orthopaedic in-patient operations which matched with the same criteria as the criteria for same day surgery procedure (clean wound, no drain, less than 2 hours, prophylactic antibiotic) were done. The age ranged from seven to 61 years old, with the median of 31 years. The cases were predominantly male (53 out of 87). The surgery were done on bone in 48 cases, and on soft tissue in 39 cases.

The age and sex distribution, the type of tissue involved and type of operations of both case-series, can be seen in table 1 and 2 as follows:

Table 1. Orthopaedic same day surgery in 1989 and orthopaedic inpatient surgery in 1988; age and sex distribution

	1988	1989
Number of cases	87	103
Age range	7 - 61	8 - 59
Median age	31	34
Male : Female	53 : 34	62 : 41

Table 2. Orthopaedic same day surgery in 1989 and orthopaedic inpatient surgery in 1988; type of tissue involved and type of operation

	1988	1989
Bone		
upper extremities	29	39
internal fixation	17	24
implant removal	12	15
lower extremities	19	12
internal fixation	16	8
implant removal	3	4
sub-total	48	51
Soft Tissue		
tendon & surrounding	28	25
tendon reconstruction	23	9
tendon transfer	5	5
tendovaginitis	-	11
joint & surrounding	11	27
contracture release	8	12
ganglion	3	15
subtotal	39	52
Total	87	103

Postoperative wound infection in same day surgery cases occurred in three cases (an incidence of 2.9 %) namely two cases with internal fixation of the lower leg and one tendon reconstruction. If we compare the two cases of infected internal fixation with all 32 internal fixation cases, the incidence of wound infection among the internal fixation cases was 6.3%. If we compare the two cases of infected internal fixation of the lower leg with all cases of internal fixation of the lower leg (which were two), the incidence of infections among the internal fixation of the lower leg cases was 100%; and if we compare with all bone surgery cases which were 48 cases, the incidence was 3.9%.

The infected soft tissue surgery cases was one case of tendon reconstruction operation out of seven tendon reconstruction surgery cases (14.3%) or out of 52 cases of soft tissue surgery cases (1.9%).

In the in-patient orthopaedic surgery cases, postoperative wound infection occurred in six cases (6.9%), five with internal fixation to the bone and one with joint contracture release followed by skin grafting. The incidence of infection after internal fixation was 15.1% (five infected cases out of 33 cases of internal fixation) and the incidence of infection after internal fixation of the lower leg (three infected cases out of nine cases of internal fixation of the lower leg) was 33.3%. The incidence of infection after bone surgery (five infected cases out of 48 cases of bone surgery) was 10.4% and the incidence of infection after

soft tissue surgery (one infected case after 39 cases of soft tissue surgery) was 2.6%.

The postoperative length of stay of the same day surgery was zero (since there was no postoperative hospitalization) as compared with the postoperative length of stay of the in-patient operative surgery which was 2.1 days (all cases) or 2.5 days (bone surgery cases) and 1.7 days (soft tissue surgery). The postoperative length of stay of internal fixation cases was 3.1 days, while the postoperative length of stay of the internal fixation of the lower leg was 3.7 days. The length of stay after surgery of orthopaedic implant removal was one day.

The comparison of the incidence of postoperative wound infection and the postoperative length of stay of same day orthopaedic surgery and in-patient orthopaedic surgery can be seen in table 3.

Table 3. The incidence of POWI (%) and the postoperative length of stay (days) in same day orthopaedic surgery / SDOS (1989) and in in-patient orthopaedic surgery / IPOS (1988)

Type of surgical cal procedure	IPOS (1988) POWI	(1988) LOS	SDOS (1989) POWI	(1989) LOS
All internal fixation	15.1	3.1	6.3	0
Internal fix of the lower leg	33.3	3.7	100.0	0
Surgery to the bone	10.4	2.5	3.9	0
Surgery to the soft tissue	2.6	1.7	1.9	0
All orthopaedic surgery cases	6.9	2.1	2.9	0

DISCUSSION

Same day surgery procedures developed very rapidly during the last five years, due to the advent of new minimally invasive surgical procedures such as arthroscopic surgery and laparoscopic surgery.¹ Further more the scarcity of resources which cause the cost containment in hospital also gave a significant contribution to such development. Also the invention of new anaesthetic drugs such as propofol and flumazenil enable the patients to have a rapid and comfortable postanaesthetic recovery,² so that the same day surgery can be done using general anaesthetics. In orthopaedic field, arthroscopic surgery can be done as a same day

surgical procedure,^{3,4,5} and in digestive surgery field a laparoscopic cholecystectomy also can be done as a same day surgical procedure.^{6,7,8} The development of same day surgery procedures and the growth of the same day surgery center in the United States were so rapid that it was predicted that by the end of the century, 60-66% of surgery will be performed as out-patient or same day surgery procedure.⁹ In the United Kingdom the same day surgery procedure resulted in the decrease in the waiting list of patients for elective surgical procedure.^{10,11}

The impact of same day surgery procedure on the incidence of postoperative wound infection was reported by Southern Surgeons Club.⁶ The report an incidence of 0.9% among 1518 laparoscopic cholecystectomies, 216 of which were treated with same day surgery procedure, and no case showed increase in the length of stay or was re-hospitalized. In the orthopaedic field the incidence of postoperative wound infection in same day orthopaedic surgery cases was very low. Older¹² reported the incidence of two cases among 2838 cases (the incidence of 0.07%) of same day orthopaedic surgery cases, one case after arthroscopic surgery, one case after osteotomy. Seeing the above figure, the incidence of postoperative wound infection in this series was relatively higher (2.9%), but if we compare with the incidence of postoperative wound infection in orthopaedic in-patient surgery cases in this series, which was 6.9%, or with the incidence of postoperative wound infection in the same hospital but in another period of study, done by the author (which were 4.9% and 5.5%),^{13,14} the incidence of postoperative wound infection in same day orthopaedic surgery was relatively and significantly lower. However realizing the fact that the comparison of the incidence between same day surgery procedure and in-patient surgical procedure was done using case series of different periods (the incidence of 6.9% in 1988 was before the policy of implementing same day surgery procedure and the incidence of 2.9% in 1989 was the incidence in the period after the implementation of the policy), and using different composition of cases (21.9% and 6.9% were the incidence among the patients in three hospitals, one government and two private hospitals, and 4.9% was the incidence among the patients in one government hospital, whereas 5.5% was the incidence among cases of private hospital), we have to be very careful in making the conclusion of this research. A different research design for instance prospective cohort design might be necessary to make a more valid conclusion, even this kind of design would be difficult since same day procedure is a policy rather than a exposure factor and previous research

which analysed the impact of same day surgery was also using the historical comparison.

The fact that the incidence of postoperative wound infection of the same day surgery cases was lower than that of the in-patient surgery can be explained by the fact that the preoperative length of stay in same day surgery is zero, while in in-patient surgery, the patients were admitted a few days before surgery, and some previous study showed that the longer the preoperative stay in the hospital, the higher the postoperative infection rate.^{13,14}

Concerning the impact of same day surgery on the postoperative length of stay, this study showed that the average postoperative length of stay was reduce by 2.1 days, ranging from one to six days, after the implementation of same day surgery policy. This means that there is a saving of 2.1 times the cost of one hospitalization day per patient per operation. Besides the saving, the bed can be used for elective surgery which need in-patient surgery procedure so that the waiting time for elective surgery can be reduced. In the United Kingdom the waiting time for hernia operation is reduced from three years to three weeks.¹⁵ This financial saving nationally means the saving of national health expenditures by 65% of the saving of 35% to 70% of private health insurance expenditures.¹⁶

CONCLUSION

The study on the impact of the implementation of same day surgery on the incidence of postoperative wound infection and on the reduction of postoperative length of stay showed the reduction of the incidence of wound infection from 6.9% to 2.9%, and the reduction of the postoperative length of stay by 2.1 days. All the findings were based on the historical comparison with the in-patient surgery cases done in the same hospital by the same surgeon, using the same criteria of inclusion to the study cohort.

REFERENCES

1. Davis JE. Ambulatory Surgery, how far can we go, *Med Clin North Am* 1993; 77/2 : 365-75.
2. Heath PJ, Kennedy DJ, Ogg TW, Dunling C, Gilks WR. Which intravenous induction agent for day surgery ? *Anaesthesia* 1988; 43 : 365-68.
3. Older J, Cardoso T. First year's experience of day-case arthroscopy in diagnosis and management of disorder of the knee joint, *Lancet* 1983; 30 : 264-67.
4. Witherow G. Meniscal Repair, paper presented at the International Conference and Exhibition on Same Day Surgery, Perth Australia 1993.

5. Holt K. Logamentous Reconstruction of the Knee, paper presented at the International Conference and Exhibition on Same Day Surgery, Perth Australia 1993.
6. Southern Surgeons Club. A prospective analysis of 1518 laparoscopic cholectstomies, *The New Eng J Med* 1991; 324 : 1073-8.
7. Fletcher DR. Laparoscopic Cholecystectomy, Techniques, Pitfalls & Cost Implications, paper presented at the International Conference and Exhibition on Same Day Surgery, Perth Australia 1993.
8. Hailey D. Laparoscopic Cholecystectomy - Potential Impact and Reality, paper presented at the International Conference and Exhibition on Same Day Surgery, Perth Australia 1993.
9. Davis JE. The future of Major Ambulatory Surgery, *Surg Clin North Am* 1987; 67 : 893-901.
10. Lakhani S, Leach RD, Jarrett PEM. Effect of a surgical day unit on waiting lists, *J Royal Soc Med* 1987; 80 : 628-29.
11. Ogg TW. Use of Anaesthesia, Implications of day-case surgery and anaesthesia, *Brit Med J* 1980; 10 : 212-4.
12. Older J. The first four years experience of day case orthopaedic surgery in a district general hospital, *Ann Roy Coll Surg England* 1988; 70 : 21.
13. Djojogugito MA. Infeksi Luka Operasi Nosokomial, Penelitian Klinis, Mikrobiologis, Epidemiologis dan Manajerial, Disertasi FKUI, 1990.
14. Djojogugito MA. Risk Factor in Nosokomial Postoperative Orthopaedic Wound Infection in Private Hospital, paper presented at Western Pacific Orthopaedic Association Congress, Singapore 1989.
15. Baskerville PA, Jarrett PE. Day case inguinal hernia repair under local anaesthetic, *Ann Roy Coll Surg England* 1983; 65 : 224-5.
16. Jarrett P. The Economics of Day Surgery in United Kingdom, paper presented at the International Conference and Exhibition on Same Day Surgery, Perth Australia 1993.