

Spadework for Establishing Integrative Enhanced Recovery Program After Spine Surgery: Web-Based Survey Assessing Korean Medical Doctors' Perspectives

Jung-Hyun Kim ¹, Sung-Min Kim², Yong-Chan Kim^{2,*}, Byung-Kwan Seo ^{3,*}

¹Department of Acupuncture & Moxibustion, Kyung Hee University Hospital at Gangdong, Gangdong-gu, Seoul, 05278, Republic of Korea;

²Department of Orthopaedic Surgery, Kyung Hee University Hospital at Gangdong, Gangdong-gu, Seoul, 05278, Republic of Korea; ³Department of Acupuncture & Moxibustion Medicine, College of Korean Medicine, Kyung Hee University, Dongdaemun-gu, Seoul, 02447, Republic of Korea

*These authors contributed equally to this work

Correspondence: Byung-Kwan Seo, Department of Acupuncture & Moxibustion Medicine, College of Korean Medicine, Kyung Hee University, 26, Kyunghedae-ro, Dongdaemun-gu, Seoul, 02447, Republic of Korea, Tel +82-2-440-6239, Fax +82-2-440-7143, Email seohbk@hanmail.net

Introduction: Efforts are necessary to promote postoperative patient management to reduce complications or side effects, particularly those adapted to spinal surgery. Considering compatible medical system in Korea, the study objective is to report the opinions of Korean medical doctors regarding integrative enhanced recovery after spine surgery.

Methods: From December 2020 to January 2021, members of the Korean Medical Association were asked to complete an online questionnaire regarding an integrative enhanced recovery program after spine surgery. A total of 726 participants responded to the survey.

Results: Approximately half of the respondents had more than 10 years of medical experience in the Korean health-care system, and 58.29% were affiliated with primary Korean medical clinics. The majority of respondents were not aware of the ERAS program (N = 412, 79.08%) but said that patient management would be advanced from the establishment of a postoperative medical program that reflected an integrated medical perspective (N = 505, 96.92%). Furthermore, Korean medical professionals believe that Korean medical interventions should play a major role in the pain management and digestive improvement sections of the upcoming postoperative program. Moreover, respondents claimed that Korean traditional medical modalities such as acupuncture, moxibustion, cupping, and herbal decoction should be included in the program.

Discussion/Conclusion: Responses collected from the present study can be used as a spadework for future studies. A study on the development of a comprehensive postoperative program that reflects the perspectives of patients and conventional medical doctors is needed.

Keywords: enhanced recovery after surgery, web-based survey, Korean medical doctors, spinal surgery

Introduction

Since 1997, the program of enhanced recovery after surgery (ERAS) was presented.¹ To date, ERAS programs have been encouraged by numerous surgical societies and health institutes.^{2,3} Theoretically, clinical implementation of ERAS has the effect of increasing patient comfort and satisfaction and reducing the likelihood of complications by reducing invasiveness in the surgical procedure. This effect can also be expected to reduce the postoperative length of stay (LOS).⁴

As discussed previously, in the ERAS program, numerous steps are applied around the pre- and post-operative durations through the illustration of possible checklists. This potential checklist can contain pre-admission counseling, dietary teaching and physical therapies.⁵ Additionally, the implementation of surgical approaches that minimizes invasive lesions and anesthesia procedures that reduces opioid usage can be included.⁶ However, since there can be several adverse effects,^{7,8} there is a growing demand for alternative medical approaches to reduce drug usage and reduce these adverse effects.

The supply of ERAS in spinal surgery is scarcely considered from an integrative medical perspective. Although numerous articles on ERAS are likely to illustrate its advantages for patients, caregivers, and whole health-care system,⁹⁻¹² the powerfulness of ERAS in spine surgery has not been sufficiently perceived within other clinical contexts. This is demonstrated by its marginal rates of implementation in the clinical field of Korean public and private hospitals.

Nevertheless, the demand for postoperative medical programs that reflect an integrated perspective is growing,¹³ thereby justifying the development of ERAS programs. Moreover, in order to do this, collecting opinions from medical service donors as a pre-development step is crucial.

Our aim was a) to demonstrate the collected opinions of Korean medical professionals on ERAS' integrative medical approach in spine surgery, by means of a multicenter survey distributed online (SurveyMonkey[®]) and b) to establish a spadework for reinforce the evidence for integrative medical program after spinal surgery.

Methods

Questionnaire Development

First, the authors conducted a review to establish the basic structure of the questionnaire that was to be used for the development of integrative enhanced recovery program after spinal surgery. The authors performed a thorough review of previously developed clinical practice guideline for management after spinal surgery.^{14,15} After this review, the authors have agreed that the spinal surgery widely covers surgical domain (cervical, thoracic and lumbar) and surgical method (microscopic spinal decompression, artificial disc replacement, mini-anterior and posterior fusion, mini-deformity surgery and radical correction of spine) in this study. Consequently, the authors were able to draft a questionnaire for the development of an integrated medical program for enhanced recovery of spinal surgery. Researchers then formed an eight-person development committee with professionals who had no conflict of interest in developing the questionnaire. This committee comprised experts in conventional and complementary medicine. Committee members reviewed the questionnaire draft and critically commented on it.

The draft was thoroughly reviewed, and it was finally developed into draft questionnaire in the Korean language, including questions on demographic characteristics, clinical environment, and recognition and demand, which was verified by the development committee. The authors of the present study recruited an independent committee to ensure the validity and reliability of the established questionnaire. All three members of this committee had no conflict of interest with this project. In terms of face validity, members of the Committee agreed that the items asked in this questionnaire reflected what was originally intended to be measured. Furthermore, the members assessed the internal validity to ensure the reliability of the questionnaire (Cronbach's alpha score = 0.79)

Recruitment

From November 2020 to December 2020, members of the association of Korean medicine (AKOM) were questioned to fill an online survey regarding ERAS with an integrative medical approach in spine surgery, through the SurveyMonkey[®] online stand. Members of the AKOM only stands for Korean traditional medical professionals, not surgeons. Although it was expected that the response rate would not be high considering the scope of Korean traditional medicine doctors' treatment in a wide range of medical fields, e-mails were nevertheless sent to all members to reduce the risk of bias. This web-based questionnaire was completely voluntary and non-commercial.

Data Collection

All subjects reported their demographic data and completed standardized questionnaires that assessed their opinion and insights dealing integrative enhanced recovery program after spine surgery. To assure the methodological quality of survey, we limited the response range of some items. In some items, the age range was settled to 6 to 80 years old. Some items were presented in reverse. These settings promoted respondents to answer cautiously through detailed explanations. Additionally, questionnaires that were finished through less than 1 minute or more than 60 minutes would be excluded from analysis. Finally, a total of 726 respondents who filled out the questionnaires were included in the analysis.

Ethical Statement

This study was proceeded in accordance with the Declaration of Helsinki, and was approved by the Ethics Committee of Kyung hee University Hospital at Gangdong. Electronic informed consent was acquired from each participant prior to starting the procedure. Respondent could drop out from the survey at any moment without providing any justification.

Statistical Analysis

Statistical analysis was accomplished using GraphPad Prism 8 v8.3.1 (GraphPad Software Inc., San Diego, CA). The statistical significance threshold was settled at $p = 0.05$. A standard chi-square analysis was utilized to assess raw distributions.

Results

A total of 726 Korean medical professionals responded to 15 items after a short introduction on ERAS with an integrative medical approach in spine surgery. Data on the demographic characteristics are summarized in [Table 1](#).

Table 1 Characteristics of the 726 Korean Medical Professionals Who Completed the Survey

Variable	N ^a (%)
Age	
20–29 years	93 (13.29)
30–39 years	289 (41.29)
40–49 years	193 (27.57)
50–59 years	100 (14.29)
60–69 years	23 (3.29)
70 years or more	2 (0.27)
Gender	
Male	498 (71.14)
Female	202 (28.86)
Years in Korean medicine	
Under 5 years	207 (29.57)
5 years to 9 years	156 (22.29)
10 years to 19 years	209 (29.86)
20 years or more	128 (18.28)
Affiliated institution	
Primary Korean medical clinic	408 (58.29)
Korean medical hospital	173 (24.71)
Public healthcare center	46 (6.57)
Nursing hospital	43 (6.14)
Integrative medical hospital	17 (2.43)
Others	13 (1.86)

Note: ^a700 responses totally collected, 23 responses are missing.

Regarding seniority in the Korean medical field, the majority of participants reported having over 10 years of clinical practice experience (N = 337, 48.14%), followed by those under 5 years (N = 207, 29.57%), and 5–9 years (N = 156, 22.29%). Women represented a minority (28.86%) of the overall responders. Most respondents were dedicated to primary Korean medical clinics (N = 408, 58.29%), followed by Korean medical professionals working in Korean medical hospitals, which refers to hospitals specialized in Korean medical practice (N = 173, 24.71%), public health-care centers (N = 46, 6.57%), nursing hospitals (N = 43, 6.14%), and integrative medical hospitals (N = 17, 2.43%).

Overall Opinion on Developing ERAS-K After Spine Surgery

A total of 512 respondents have finished their reply which covers with an overall opinion about an integrative medical program called ERAS-K in the future. More than half of the Korean medical professionals (N = 412, 79.08%) were not knowledgeable with the concept of ERAS with an integrative medical approach in spine surgery. The plurality of Korean medical professionals (N = 505, 96.92%) believed integrative medical programs as a helpful approach to improve patient management. However, a total of 3 (5.76%) respondents reported that if implemented, these programs may cause a decline in the quality of therapy. Collected responses from the overall cohort on the ERAS in spine surgery are illustrated in Table 2.

Opinion on the Role of Korean Medical Treatment for ERAS in Spine Surgery

In this survey, Korean medical professionals were asked about the role of Korean medical treatment in enhanced recovery after spinal surgery. Korean medical professionals considered Korean medical interventions to be helpful in the areas of pain management, recovery of postoperative digestion, and contracture prevention. However, in terms of reducing blood loss, relieving anxiety and restlessness, and providing psychological stability, Korean medicine was reported to be unsatisfactory (Figure 1).

When asked if Korean medical treatments were needed for patients after spinal surgery, more than half of the participants considered that Korean medical treatment should be applied to patients who admitted to Korean medicine hospitals after surgery and to patients visiting primary Korean medical clinics as outpatients (Figure 2).

Finally, most of the respondents said that the application of acupuncture, moxibustion, cupping, and herbal decoction should take place after spinal surgery. The other interventions include Korean traditional exercise therapy, acupotomy and thread embedding. The opinions that these medications should be applied before surgery was relatively small (Figure 3).

Table 2 Cohort Familiarity, Rate of Perception and Opinion of ERAS in Korean Medicine

Familiarity with ERAS	N ^a (%)
Highly knowledgeable	11 (2.11)
Knowledgeable	35 (6.72)
Moderate	63 (12.09)
Less knowledgeable	244 (46.83)
Not knowledgeable at all	168 (32.25)
Do you think an integrated medical program needs to be developed for rapid postoperative recovery?	
Highly agreeable	358 (68.71)
Agree	147 (28.21)
Moderate	13 (2.50)
Quite not needed	2 (0.38)
Not needed at all	1 (0.19)

Note: ^a521 responses totally collected, 205 responses are missing.

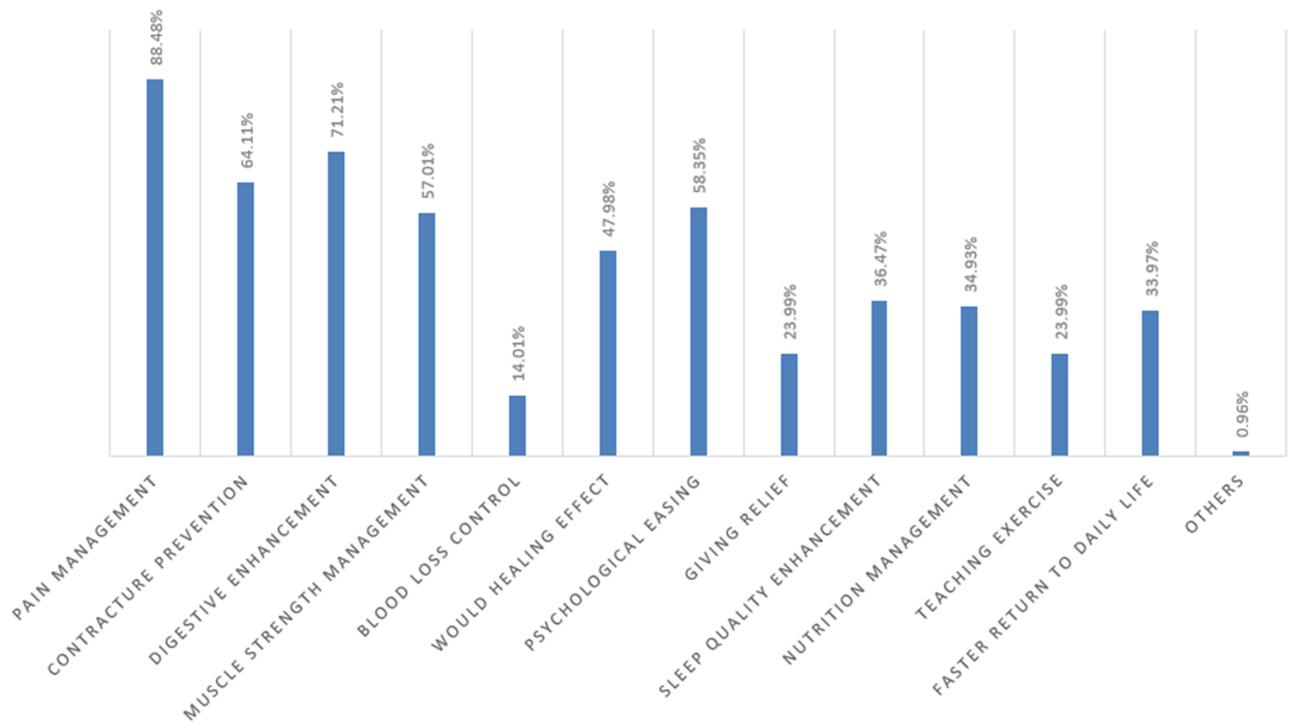


Figure 1 Areas where Korean medical treatment can play a meaningful role in early recovery after spine surgery.

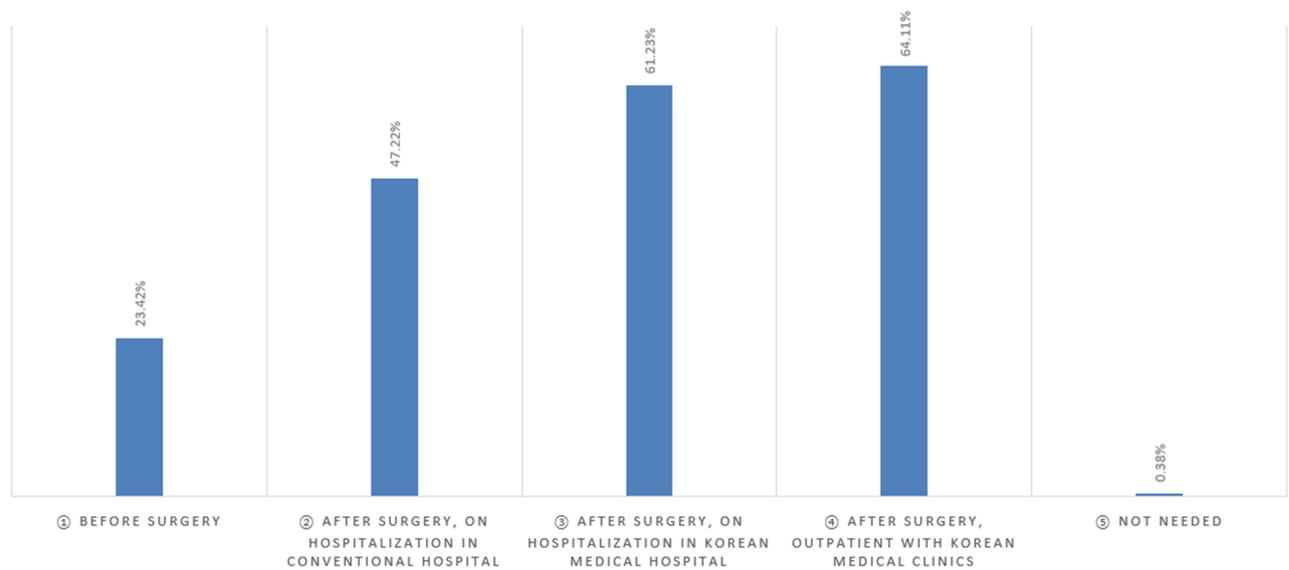


Figure 2 When Korean medical treatments are needed after spinal surgery.

Participants' Experiences with Postoperative Patients in Spine Surgery

In the first half of this category, Korean medical professionals were asked whether they had treated patients after spinal surgery, and if so, which Korean medical interventions were administered to the patient. The majority of respondents said that they had experience in treating post-spinal surgery patients, and many of them had previously prescribed acupuncture, moxibustion, cupping, and herbal decoction (Figure 4).

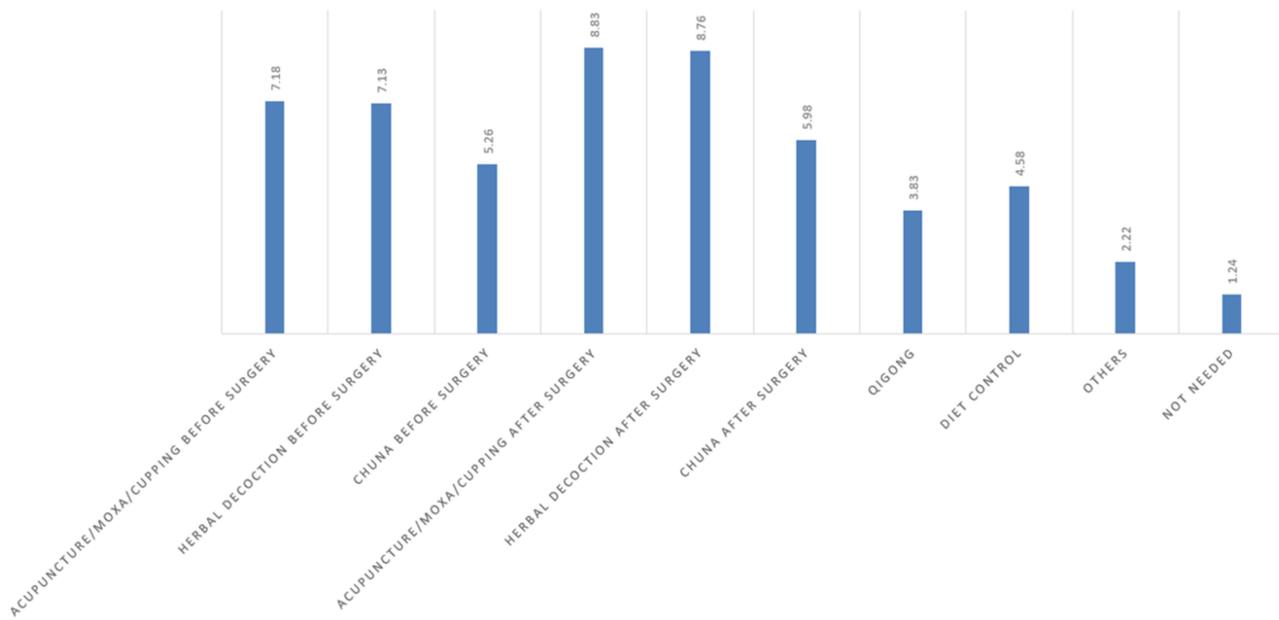


Figure 3 Type of Korean medical interventions needed for rapid recovery after spinal surgery.

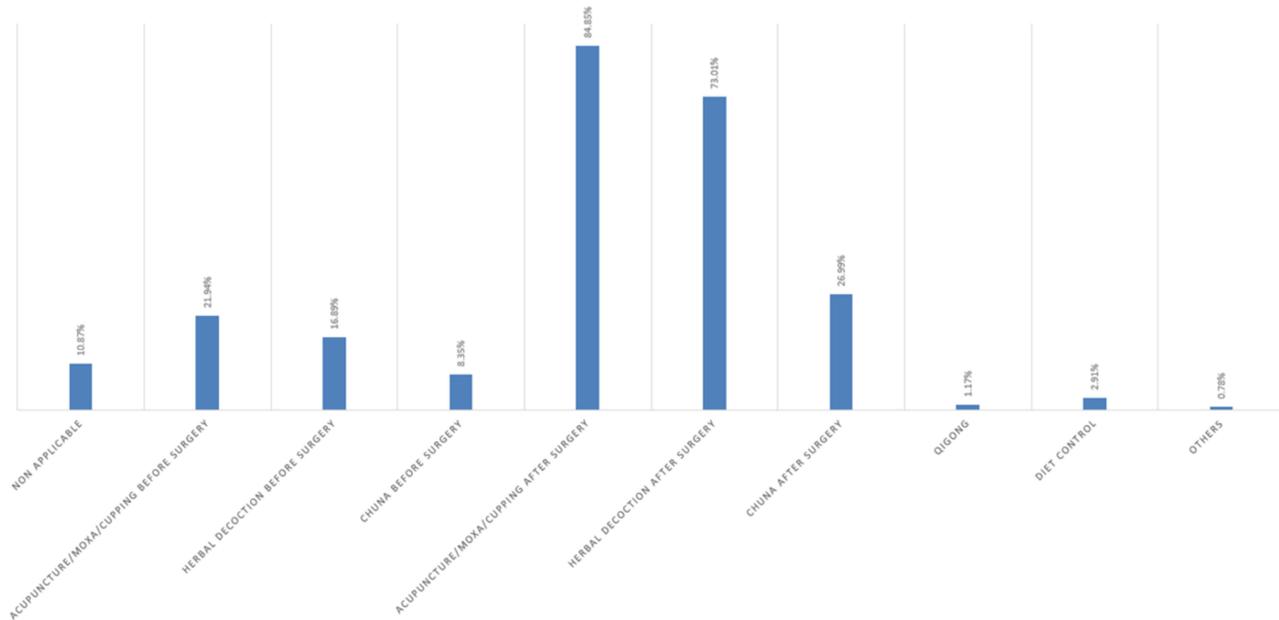


Figure 4 Actual Korean medical interventions applied to patients with spinal surgery (515 answered; 211 skipped).

Subsequently, participants were asked whether Korean medical treatments played a pivotal role in the enhanced recovery of patients who underwent spinal surgery based on patient care experience. Most participants reported that Korean medical treatments played a crucial role in the enhanced recovery of patients after surgery (Figure 5). In questions about manageable aspects of postoperative care, pain management and contracture prevention showed a similar result with previous responses. However, contrary to earlier responses, few participants reported that Korean medical treatments helped improve digestion. Instead, a relatively high number of respondents reported that Korean medical treatments were helpful in managing muscle strength and contributing towards a faster return to daily life (Figure 6).

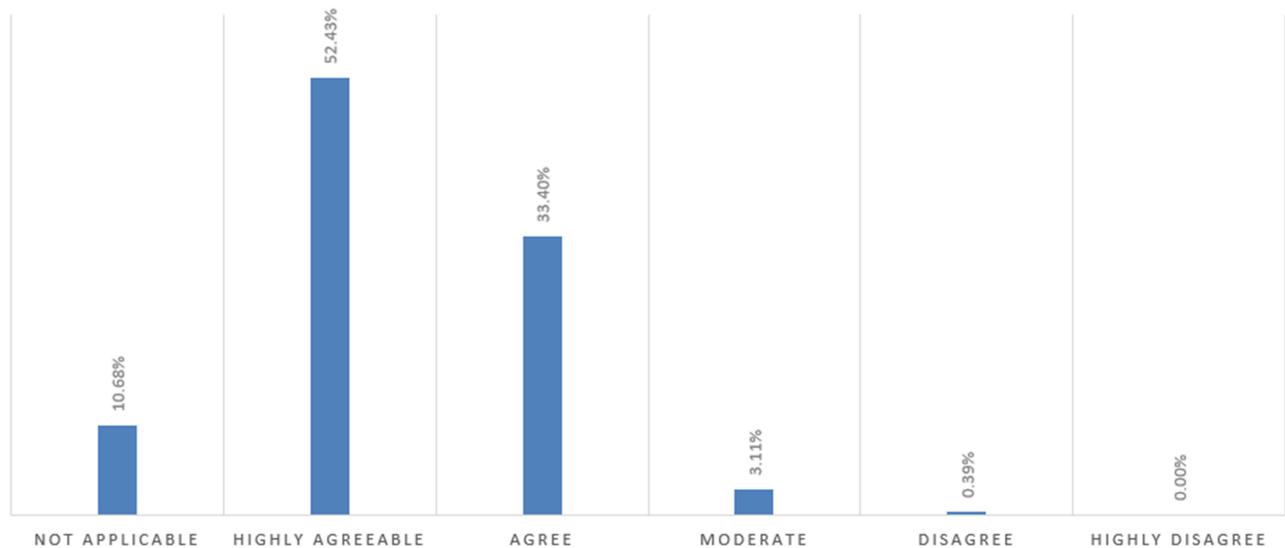


Figure 5 Did Korean medical interventions play a role in recovery of patients with spinal surgery? (515 answered; 211 skipped).

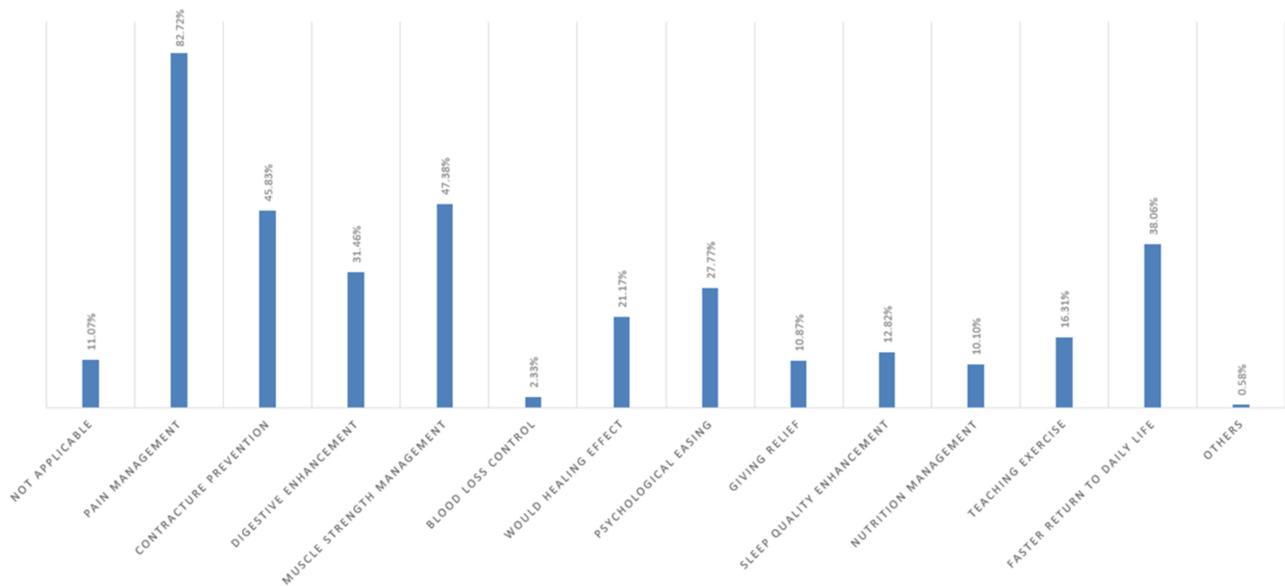


Figure 6 In what ways did Korean medical treatments help patients recover rapidly after spinal surgery? (515 answered; 211 skipped).

Discussion

Analyzing the result of the survey, the authors investigated the general perspectives on ERAS with an integrative medical approach in spine surgery among Korean medical professionals. To date, this is the initial study to assess the understanding of ERAS in spine surgery among Korean medical professionals.

Cognition with ERAS Program Among Korean Medical Professionals

Among the 700 Korean medical professionals who responded to the survey, only 8.83% were knowledgeable with the notion of ERAS regarding spine surgery. These results were significant considering the ability of ERAS to promote satisfaction of patients and overall invasiveness decrease around perioperative procedures.¹⁶ Furthermore, because the

implementation of ERAS is not yet widespread in the traditional Chinese medical domain,¹⁷ the results of the present study seem to be consistent. In addition, the lack of awareness of ERAS among Korean medical professionals reflects the discrepancy between the needs and efforts for advancement with managing patients in daily clinical practice. Conclusively, we discovered that despite a growing interest in this issue, the spread of ERAS reflecting an integrative medical perspective is still not optimal.

Opinion on the Role of Korean Medical Treatment for ERAS in Spine Surgery

As outlined in the Results section and according to previous studies on similar topics, Korean medical professionals expected Korean medical treatment in ERAS programs to play a role in pain management, digestive function improvement, and contracture prevention.

Several existing studies have demonstrated the use of Korean medical interventions to reduce pain during postoperative care. Cho et al reported a significant pain reduction as a result of applying acupuncture to patients experiencing acute postoperative pain after back surgery,¹⁸ while Usichenko et al reported on the pain-killing effects of auricular acupuncture on pain management after surgery.¹⁹ Furthermore, using a randomized controlled method, Coura et al demonstrated the effectiveness of EA in the pain management of patients who had undergone cardiac surgery.²⁰

Kim et al observed postoperative recovery in patients who were treated with acupuncture after undergoing colorectal cancer resection, and reported a comparative advantage in the improvement of digestive function compared to those who did not receive acupuncture treatment.²¹

Mindubaeva et al also reported significant results of preventive acupuncture application in managing secondary contracture of mimic muscle, showing the possibility that Korean medical intervention could be utilized to prevent postoperative contracture.²²

However, unlike previous studies,^{23–25} the benefits of ERAS on the length of hospital stay, time to independent walking, and medication usage reduction were relatively less recognized, indicating a gap with existing knowledge.

Most types of Korean medical interventions included acupuncture, moxibustion, cupping, and herbal decoction. Existing studies analyzed the use of complementary and alternative medicine in patients after surgery and reported that more than 60% of patients use herbal decoction for postoperative recovery.^{26,27}

Opinions in the Experiences with Postoperative Patients in Spine Surgery

As expected from the responses to the perception of ERAS, most respondents with experience in treating patients after spinal surgery considered that Korean medical treatment played a significant role in recovery. However, this result showed a disparity to the response of medical professionals who did not have experience in treating patients after spinal surgery.

Furthermore, these answers correspond to the existing results of previous studies. Korean medical modalities can also affect muscle strength; and significant effects have been reported in muscle strength management when performing acupuncture in patients with shoulder pain and functional impression after total knee arthroplasty (TKA) and neck dissection.^{28,29}

However, there are no currently published studies reporting that the time taken to the return to daily living may be accelerated when Korean medical treatments are implemented. Furthermore, some studies have applied a series of programs to postoperative patients to shorten the time taken to return to daily life after surgery.^{30,31} Hence, attempts to discuss which interventions should be included in the postoperative recovery program should be continued.

Future Challenges

Clinical indications that ERAS with integrated health-care systems should be applied after spinal surgery are encouraging.^{10,32} However, our results show that most Korean medical professionals do not utilize ERAS in their medical practice.

One possible rationale for this can be the clinical complicatedness of patients who undergo spine surgery in terms of functional disability, pain control and mental status of the disease.^{33,34} From this outlook, patients who undergo spine surgery are different from those for whom ERAS was initially designed. Furthermore, there might be a lack of understanding between the conventional and oriental medical fields. In order to choose the option of integrated health

care for better health-care decisions in a medical domain in Republic of Korea where different health systems coexist, an understanding of each other's healthcare system and its interventions is needed first. In other words, efforts are needed to share the understanding of the protocols used by each medical field and to subsequently reach a consensus in the decision-making process.

To overcome these barriers, both Korean medical professionals and conventional medical doctors should be actively involved in the development of new passageways adapted to patients who undergo spine surgery. Furthermore, it is our responsibility to appraise the expenses and to promote ERAS with an integrative medical approach to local authorities.

Strengths and Limitations

This is a pioneer survey on ERAS brought to a wide range of Korean medical professionals across a wide range of institutions. Responses were obtained through a secured platform, and statistical analyses were proceeded independently. We covered Korean medical professionals working in various health institutes, which can bring us various viewpoints into the field.

However, induced outcomes on ERAS application obtained from the overall cohort could be biased due to the methodological structure of the study, as we questioned a specific opinion only within the Korean medical field on ERAS in spine surgery. With compatible medical system in Korea, responses from conventional medical doctors were not applied to the outcomes in the present study. To overcome these shortcomings, opinions from conventional doctors should also be collected in the future. Furthermore, opinions from the public as recipients of health-care services are also required to establish an effective ERAS program with an integrative medical perspective.

Despite being promoted among Korean medical professionals, the ERAS notion has not been widely applied in daily clinical domain, as is the case in other surgical specialties. Efforts are needed to improve the efficiency of patient management by minimizing the flow of work related to surgery and to reduce complications and adverse effects of spinal surgery. Considering the results of the responses from the present study, we expect that future programs will reflect the Korean medical perspective which can overcome the shortcomings of the existing decision-making process in managing patients who have undergone spinal surgery. Furthermore, to maximize cost-saving and effective decision-making, further research needs to be conducted to discuss which interventions should be included in the program through a consensus-making procedure.

Abbreviations

AKOM, Association of Korean medicine; ERAS, Enhanced recovery after surgery; LOS, Length of stay; TKA, Total knee arthroplasty.

Ethical Approval

IRB number: KHNMC0H2020-12-002

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work. Byung-Kwan Seo and Yong-Chan Kim have equally contributed as corresponding authors in this work.

Funding

This research was supported by a grant of the Korea Health Technology R&D Project through the Korea Health Industry Development Institute (KHIDI), funded by the Ministry of Health & Welfare, Republic of Korea (grant number: HI20C1405).

Disclosure

The authors declare that they have no conflicts of interest for this work.

References

1. Fearon K, Ljungqvist O, Von Meyenfeldt M, et al. Enhanced recovery after surgery: a consensus review of clinical care for patients undergoing colonic resection. *Clin Nutr*. 2005;24(3):466–477. doi:10.1016/j.clnu.2005.02.002
2. Miralpeix E, Mancebo G, Gayete S, Corcoy M, Solé-Sedeño J-M. Role and impact of multimodal prehabilitation for gynecologic oncology patients in an enhanced recovery after surgery (ERAS) program. *Int J Gynecol Cancer*. 2019;29(8):8. doi:10.1136/ijgc-2019-000597
3. Rubinkiewicz M, Witowski J, Su M, Major P, Pędzwiatr M. Enhanced recovery after surgery (ERAS) programs for esophagectomy. *J Thorac Dis*. 2019;11(Suppl 5):S685. doi:10.21037/jtd.2018.11.56
4. Wainwright TW, Immins T, Middleton RG. Enhanced recovery after surgery (ERAS) and its applicability for major spine surgery. *Best Pract Res Clin Anaesthesiol*. 2016;30(1):91–102. doi:10.1016/j.bpa.2015.11.001
5. De Jager E, McKenna C, Bartlett L, Gunnarsson R, Ho Y-H. Postoperative adverse events inconsistently improved by the World Health Organization surgical safety checklist: a systematic literature review of 25 studies. *World J Surg*. 2016;40(8):1842–1858. doi:10.1007/s00268-016-3519-9
6. Corniola MV, Debono B, Joswig H, Lemée J-M, Tessitore E. Enhanced recovery after spine surgery: review of the literature. *Neurosurg Focus*. 2019;46(4):E2. doi:10.3171/2019.1.FOCUS18657
7. Patel N, Bagan B, Vadera S, et al. Obesity and spine surgery: relation to perioperative complications. *J Neurosurg Spine*. 2007;6(4):291–297. doi:10.3171/spi.2007.6.4.1
8. Lamperti M, Tufegdzic B, Avitsian R. Management of complex spine surgery. *Curr Opin Anaesthesiol*. 2017;30(5):551–556. doi:10.1097/ACO.0000000000000494
9. Debono B, Corniola MV, Pietton R, Sabatier P, Hamel O, Tessitore E. Benefits of enhanced recovery after surgery for fusion in degenerative spine surgery: impact on outcome, length of stay, and patient satisfaction. *Neurosurg Focus*. 2019;46(4):E6. doi:10.3171/2019.1.FOCUS18669
10. Debono B, Sabatier P, Garnault V, et al. Outpatient lumbar microdiscectomy in France: from an economic imperative to a clinical standard—an observational study of 201 cases. *World Neurosurg*. 2017;106:891–897. doi:10.1016/j.wneu.2017.07.065
11. Soffin EM, Vaishnav AS, Wetmore DS, et al. Design and implementation of an enhanced recovery after surgery (ERAS) program for minimally invasive lumbar decompression spine surgery: initial experience. *Spine*. 2019;44(9):E561–E570. doi:10.1097/BRS.0000000000002905
12. Venkata HK, van Dellen JR. A perspective on the use of an enhanced recovery program in open, non-instrumented day surgery for degenerative lumbar and cervical spinal conditions. *J Neurosurg Sci*. 2016;62(3):245–254. doi:10.23736/S0390-5616.16.03695-X
13. Bakker CJ, Wise KL, Williams BR, Swiontkowski MF. Complementary and alternative medicine for postoperative pain: a systematic review. *JBJS*. 2020;102(Suppl 1):36–46. doi:10.2106/JBJS.19.01439
14. Lin I, Wiles L, Waller R, et al. What does best practice care for musculoskeletal pain look like? Eleven consistent recommendations from high-quality clinical practice guidelines: systematic review. *Br J Sports Med*. 2020;54(2):79–86. doi:10.1136/bjsports-2018-099878
15. Oliveira CB, Maher CG, Pinto RZ, et al. Clinical practice guidelines for the management of non-specific low back pain in primary care: an updated overview. *Eur Spine J*. 2018;27(11):2791–2803. doi:10.1007/s00586-018-5673-2
16. Rinninella E, Persiani R, D'Ugo D, et al. NutriCatt protocol in the Enhanced Recovery After Surgery (ERAS) program for colorectal surgery: the nutritional support improves clinical and cost-effectiveness outcomes. *Nutrition*. 2018;50:74–81. doi:10.1016/j.nut.2018.01.013
17. Bai X, Zhang X, Lu F, et al. The implementation of an enhanced recovery after surgery (ERAS) program following pancreatic surgery in an academic medical center of China. *Pancreatol*. 2016;16(4):665–670. doi:10.1016/j.pan.2016.03.018
18. Cho YH, Kim CK, Heo KH, et al. Acupuncture for recovery after surgery in patients undergoing colorectal cancer resection: a systematic review and meta-analysis of randomized controlled trials. *Pain Pract*. 2015;15(3):279–291. doi:10.1111/papr.12208
19. Usichenko T, Lehmann C, Ernst E. Auricular acupuncture for postoperative pain control: a systematic review of randomised clinical trials. *Anaesthesia*. 2008;63(12):1343–1348. doi:10.1111/j.1365-2044.2008.05632.x
20. Coura LEF, Manoel CHU, Poffo R, Bedin A, Westphal GA. Randomised, controlled study of preoperative electroacupuncture for postoperative pain control after cardiac surgery. *Acupunct Med*. 2011;29(1):16–20. doi:10.1136/aim.2010.003251
21. Kim KH, Kim DH, Kim HY, Son GM. Acupuncture for recovery after surgery in patients undergoing colorectal cancer resection: a systematic review and meta-analysis. *Acupunct Med*. 2016;34(4):248–256. doi:10.1136/acupmed-2015-010941
22. Mindubaeva LZ, Jakupov R, Karimova DY, Karimova G. The potential of preventive acupuncture for the management of the secondary contracture of mimic muscles. *Russian J Physiother Balneol Rehabil*. 2017;16(4):207–210. doi:10.18821/1681-3456-2017-16-4-207-210
23. Feldman LS, Lee L, Fiore J. What outcomes are important in the assessment of Enhanced Recovery After Surgery (ERAS) pathways? *Can J Anaesth*. 2015;62(2):120–130. doi:10.1007/s12630-014-0263-1
24. Pędzwiatr M, Kisialewski M, Wierdak M, et al. Early implementation of enhanced recovery after surgery (ERAS[®]) protocol—compliance improves outcomes: a prospective cohort study. *Int J Surg*. 2015;21:75–81. doi:10.1016/j.ijsu.2015.06.087
25. Medbery RL, Fernandez FG, Khullar OV. ERAS and patient reported outcomes in thoracic surgery: a review of current data. *J Thorac Dis*. 2019;11(Suppl 7):S976. doi:10.21037/jtd.2019.04.08
26. Velanovich V, Hallal N, Shah M. Patterns of usage of complementary and alternative medicine in general surgical patients. *Int J Surg*. 2006;4(4):206–211. doi:10.1016/j.ijsu.2006.03.005
27. Norred CL. A follow-up survey of the use of complementary and alternative medicines by surgical patients. *AANA J*. 2002;70(2):119–125.
28. Chen -C-C, Yang -C-C, Hu -C-C, Shih H-N, Chang Y-H, Hsieh P-H. Acupuncture for pain relief after total knee arthroplasty: a randomized controlled trial. *Reg Anesth Pain Med*. 2015;40(1):31–36. doi:10.1097/AAP.0000000000000138
29. Pfister DG, Cassileth BR, Deng GE, et al. Acupuncture for pain and dysfunction after neck dissection: results of a randomized controlled trial. *J Clin Oncol*. 2010;28(15):2565. doi:10.1200/JCO.2009.26.9860
30. Kim AR, Cho J, Hsu Y-J, et al. Changes of quality of life in gastric cancer patients after curative resection: a longitudinal cohort study in Korea. *Ann Surg*. 2012;256(6):1008–1013. doi:10.1097/SLA.0b013e31827661c9

31. Ren L, Zhu D, Wei Y, et al. Enhanced recovery after surgery (ERAS) program attenuates stress and accelerates recovery in patients after radical resection for colorectal cancer: a prospective randomized controlled trial. *World J Surg.* 2012;36(2):407–414. doi:10.1007/s00268-011-1348-4
32. Chin KR, Coombs AV, Seale JA. Feasibility and patient-reported outcomes after outpatient single-level instrumented posterior lumbar interbody fusion in a surgery center: preliminary results in 16 patients. *Spine.* 2015;40(1):E36–E42. doi:10.1097/BRS.0000000000000604
33. Stienen MN, Smoll NR, Joswig H, et al. Validation of the baseline severity stratification of objective functional impairment in lumbar degenerative disc disease. *J Neurosurg Spine.* 2017;26(5):598–604. doi:10.3171/2016.11.SPINE16683
34. Stienen MN, Smoll NR, Joswig H, et al. Influence of the mental health status on a new measure of objective functional impairment in lumbar degenerative disc disease. *Spine J.* 2017;17(6):807–813. doi:10.1016/j.spinee.2016.12.004

Journal of Pain Research

Dovepress

Publish your work in this journal

The Journal of Pain Research is an international, peer reviewed, open access, online journal that welcomes laboratory and clinical findings in the fields of pain research and the prevention and management of pain. Original research, reviews, symposium reports, hypothesis formation and commentaries are all considered for publication. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/journal-of-pain-research-journal>