Original Article

Effects of acupuncture on pain score following open kidney surgery

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Abstract

Introduction:
Post-nephrectomy pain is a major concern for surgeons. Given that acupuncture has been used for therapeutic purposes for thousands of years, and is effective for pain relief, we decided to evaluate its effects on post-nephrectomy pain.

Methods & Materials:
This clinical trial was performed on nephrectomy candidates, who were divided to acupuncture and sham group after nephrectomy and matching for age and sex. The acupuncture group received stimulation on 4 points for 30 minutes and the sham group received stimulation on other points ineffectively for 30 minutes. Then the pain experienced in the first 6 hours after the surgery was recorded by a blind observer upon acupuncture using visual analog scale (VAS). Patients' need to opioids and their dose were also recorded. Data were analyzed using the SPSS20 software and t-test.

Results:
Our results showed that pain severity was significantly lower in the acupuncture group than in the sham group (P value <0.05). Furthermore, there were 6 patients the true acupuncture group who required opioids compared to 12 patients in the sham group. Mean opioid demand in the sham group was significantly more than that in the acupuncture group (P value < 0.05).

Conclusion:
Acupuncture can significantly relieve pain and reduce demand for opioids after surgery.

Key words: Acupuncture, Pain, Nephrectomy

Introduction

Nephrectomy is a surgical procedure in which kidney is fully or partially removed. This procedure is used in treatment of renal cancer or other renal diseases and injuries. Nephrectomy is also used for removal of a healthy kidney from a donor who may be living or dead (brain dead) and transplantation to another patient. Much like other surgical procedures, a major problem following nephrectomy is the severe pain experienced by patient, which requires attention and investigation (1). Currently, narcotics are used in many health centers to relieve this pain, with many side-effects such as: dizziness, drowsiness, nausea and vomiting (2, 3). Today, various acupuncture techniques are

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experimented with in many health centers for relieving different pains. According to the Chinese traditional medicine theory, there are points on the body called organ-related points, through which life energy flows. Based on this theory, stimulation of these points (located in specific areas, and depths below skin) by stimulants such as acupuncture, can offer certain therapeutic effects. Among these effects, pain reduction in patients following surgery has always been of huge interest to specialists (4, 5). Considering availability of experts in this discipline at the University of Mashhad, and minor side-effects of acupuncture (6), it was decided to assess pain-relief effect of acupuncture following nephrectomy.

Methods & Materials

In this double-blind clinical trial study, purposive non-random sampling was conducted, and sample size was found 15 people (with 97% power) for each group of acupuncture and sham (formed according to level of pain) based on Lefevre et al. article (7) with 99% confidence. Study population consisted of all patients referred to the Urology Department of Imam Reza Hospital for nephrectomy, and all kidney donors for kidney transplant at Montaserieh Hospital. Patients free of exclusion criteria were visited by an acupuncturist prior to surgery, and their consent was obtained following explanation about treatment procedure. Study exclusion criteria were: previous surgery, previous flank surgery, addiction, and use of analgesics, neurologic and systemic diseases that interfere with process of pain, such as diabetes.

In both groups, nephrectomy was performed in flank position, with incision below and between ribs. After surgery, patients were matched in terms of age and gender, and randomly divided into acupuncture and sham groups. In acupuncture group, 4 points were stimulated by acupuncturist using special needles for 30 minutes using electro-acupuncture method. These 4 points were chosen for their location on the kidney and bladder meridian path, and included Pangguangshu BL-28 point, 1.5cm off midline along the posterior sacral second hole, Shen shu BL-23 point, 1.5cm lateral to the lower edge of spinous contour of the second lumbar vertebra, Yinling Quan SP-9 point on the medial of the shin or trough induced by the angle between internal tibia condyle and posterior tibia surface, and Qugu Ren-2 point on the midline of lower abdomen at the upper edge of symphysis pubis, 5cm below the navel. In the sham group, points other than those described were stimulated for 30 minutes with very thin needles. Intensity of pain in the first 6 hours following surgery (every hour, from first hour, second hour, third, fourth, fifth, and sixth) was recorded by an observer blind to acupuncture according to patient's report based on a 10-part VAS criteria (including: No pain=0, very little pain=1 and 2, little pain= 3, and 4, moderate=5 and 6, severe=7 and 8, and very severe=9 and 10). A specific dose of petidine was administered and recorded for patients in need of pain relief. Data were collected through interviews with patients.

Analysis of data:

Data were analyzed using SPSS-20 software, and central and spread indicators, and distribution of data were determined. T-test was used, since normal distribution of variables including pain, age, and opiate dose was confirmed by Kolmogorov-Smirnov test. Chi-squared or Fisher Exact test was used for qualitative parameters.

Results

A total of 30 patients referred to Imam Reza and Motaserieh hospitals for nephrectomy entered study, of whom, 15 were assigned to True acupuncture group and 15 to sham group. Of these 30 patients, 13 (43.3%) were male and 17 (56.7%) were female. There were 6 (40%) male and 9 (60%) female patients in true

acupuncture group, and 7 (46.7%) male and 8 (53.3%) female patients in sham group. According to Chi-squared results, no significant difference was found between two groups in terms of gender (P=0.713).

Mean age of participants was 40.8 years, with standard deviation 12.54. The youngest participant was 25 year-old, and the oldest 62 year-old. Patients' median age was 35 years. In true acupuncture group, mean age was 39.93±12.76 years, and in sham group 41.66±12.69 years. Thus, mean age was lower in the former group compared to sham group, but independent T-test showed no significant difference between two groups in terms of age (P=0.712).

Pain level in true and sham acupuncture groups:

This was measured using VAS scale, and mean pain was found 5.8±1.14 in acupuncture group, and 7.46±0.915 in sham group. According to independent t-test, the difference between two groups was significant in terms of mean pain (P≤0.001).

Table 1: Intensity of pain in two groups

Variables	Group		Test results
	True acupuncture	Sham acupuncture	
	Mean ± SD	Mean ± SD	
Pain intensity	5.8±1.14	7.46±0.915	<0.001

Need for opioids in true and sham acupuncture groups:

Six patients (40%) from true acupuncture, and 12 (80%) from sham groups needed opioids, and 9 (60%) in true acupuncture and 3 (20%) in sham groups did not require opioids. Chi-squared test results showed a significant difference between the two groups in terms of need for opioids (P=0.025). Painkiller was administered for all patients requiring opioids. Mean painkiller use on the first day following surgery is shown in table 2. Independent t-test showed a significant difference between the two groups in the administered dose of opioids (P=0.002).

Table 2: Need for opioids in the two groups

	True acupuncture	Sham acupuncture
Number	6	12
Percentage	14.16±18.21	42.50±26.64

Discussion

The present study showed that the intensity of post-nephrectomy pain was significantly lower in true acupuncture group compared to the sham group. Moreover, the number of patients requiring opioids to relieve their post-nephrectomy pain was significantly lower in true acupuncture group (40%) compared to that in the sham group (60%). Results of a study by Lfori et al. on the pain-reducing effects of acupuncture following renal surgery in 16 patients in acupuncture and sham groups showed significantly lower intensity of pain in acupuncture group (7).

Licar et al. studied pain-reducing effects of acupuncture following nephrectomy (2007), in which 44 nephrectomy candidates were divided into acupuncture and sham groups. Pain intensity was measured using VAS, and patients' need for opioids was also assessed and recorded. Morphine was administered for patients requiring analgesics. The results showed significantly lower pain intensity and need for opioids in acupuncture group compared to the control group, and even patients' first request for painkillers occurred much later in the acupuncture group (8). Similar to the present study,

electro-acupuncture method was used in their study, 30 minutes after nephrectomy, and also similarly, VAS was used to assess pain intensity. However, they chose acupuncture points around ears, which is different from the points in the present study. We selected some points that had already proved to have analgesic effects. Moreover, other points were selected near the incision, which were not found in other similar studies.

Raji et al. investigated efficacy of acupuncture in pain-reducing following inguinal herniorrhaphy. Needles were inserted in specific points in the acupuncture group, and in non-specific points in the control group. Then, pain intensity was measured using VAS. The results showed a significant reduction in pain intensity (9). We used electro-acupuncture, but they used acupuncture. We selected Pangguangshu BL-28, Shen shu BL-23, Yinling Quan SP-9, and Qugu Ren-2 points while they used GV2, GV4, and SP6 points.

In a clinical trial, Yushico et al. (2005) showed a significant pain reduction following outpatient knee surgery and 32% reduction in the need for opioid administration through acupuncture (10, 11). We studied 30 patients and used electro-acupuncture, but they studied fewer patients and used acupuncture needles. Different points were used in their study (around the ear) compared to the present study. Similar to the present study, VAS was used in theirs to assess pain intensity.

Skyland et al. (2002) studied the effect of acupuncture on reducing labor pain in 210 patients, and the results suggested positive effects of acupuncture on labor pain (12). In their study, a larger sample size and acupuncture needles were used compared to sample size and electro-acupuncture used in the present study. Points used in their study included the shin, thigh, wrist, and knee, which were different from points in the present study. However, in both studies, VAS was used to measure pain intensity.

Lewis et al. reviewed articles on acupuncture and backache over the last 50 years, and asserted that acupuncture improves chronic pains and backache in people (13). Neural mechanism suggested for analgesic effects of acupuncture is explained as activation of small myelinated nerve fibers in muscles by inserting needles, and transmitting stimulations to the spinal cord, and thus activating 3 centers of spinal cord, midbrain and hypothalamus-pituitary axis, and releasing neurotransmitters (endorphins and monoamines) to stop pain massages. High frequency stimulations in spinal cord and midbrain relieve pain through non-endorphin GABA pathway. Hypothalamus-pituitary axis is not stimulated at high frequency, and is only activated by low frequency stimulation (14-16).

Some studies have shown that electro-acupuncture is not effective in reducing pain, including Gilbert et al. study that showed electro-acupuncture had no effect in reducing pain effect after herniorrhaphy, and suggested further studies were required in this area (17). Similar to the present study, electro-acupuncture and VAS were used, but in their study, only incision points were stimulated.

In a systematic review study by Lee et al. (2005) on the postoperative pain-reducing effects of acupuncture, no definitive evidence was offered on pain-reducing efficacy of acupuncture (18). In these studies, the right needle points may not have been chosen. For more definitive results and better judgment, further studies with larger sample size are required. Generally, following studies conducted, and the present study results, it seems that acupuncture can reduce pain after many types of surgeries, including nephrectomy. Given negligible side-effects of acupuncture, and considering use of opioids for pain relief in many nephrectomy cases and their subsequent

side-effects, acupuncture can offer postoperative pain reduction and prevent potential side-effects caused by analgesics and opioids. The results of the present study can be used to recommend acupuncture for postoperative pain relief with greater certainty because a control group was used for comparison.

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