Laparoscopic simple nephrectomy patient with situs inversus totalis and left renal hypoplasia: A case report

Haci Ibrahim Cimen, MD; Yavuz Tarik Atik, MD; Oztug Adsan, MD

Department of Urology, Sakarya University Training and Research Hospital, Turkey

Cite as: *Can Urol Assoc J* 2015;9(7-8):E521-3. http://dx.doi.org/10.5489/cuaj.2824
Published online July 17, 2015.

Abstract

Situs inversus totalis (SIT) is a relatively rare anatomical condition characterized by the transposition of thoracic and abdominal organs from the normal side to the opposite position. Most reports of laparoscopic procedures in patients with SIT cite technical difficulties and longer operative times due to disorientation because of the reversed abdominal organs and necessary modification of the surgeon's movements and techniques. We present a case of a patient with SIT in whom a transperitoneal laparoscopic simple nephrectomy was performed.

Introduction

Situs inversus totalis (SIT) is a congenital anomaly in which the major visceral and thoracic organs are reversed or mirrored from their normal positions. SIT is very rare, with a prevalance of 1/20 000. As a result of benign pathology, most patients are undiagnosed.[1]

SIT is associated with cardiac, pulmonary and renal abnormalities; however, it is rare to have a patient with SIT and renal hypoplasia.[2] Most reports of laparoscopic procedures in patients with SIT cite technical difficulties and longer operative times due to disorientation because of the reversed abdominal organs and necessary modification of the surgeon's techniques.[3-5] We present a transperitoneal laparoscopic simple nephrectomy in a patient with SIT.

Case report

A 48-year-old woman presented with left flank pain. She has had hypertension for 10 years and there was no history of stone disease. Kidney ureter and bladder radiography revealed a small left kidney shadow. A computed tomography (CT) demonstrated left hypoplastic kidney and mirror image of organs with left to right transposition, resulting in a diagnosis of SIT (Fig. 1, Fig. 2). Chest x-ray revealed dextracardia (Fig. 3). The left kidney has a 5% function on dimercaptosuccinic acid renal scan imaging. The left flank pain and hypertension were attributed to the left hypoplasic kidney; therefore, a transperitoneal left laparoscopic simple nephrectomy was scheduled. In the right lateral position, two 10-mm ports and one 5-mm port were placed in abdomen (Fig. 4). Pneumoperitoneum was achived with 12 mmHg of carbon dioxide. After mobilization of the ascended colon, we identified and dissected the left ureter. With guidance of the left ureter, the left renal hilum was identified and renal artery and vein were dissected and clipped seperately with Hem-o-lok clips. The specimen was removed with a small gibson incision. The insufflation time was 42 minutes, and the estimated blood loss was 50 mL. No complications occured and the patient's postoperative course was uneventful. She was discharged postoperative day 2. The pathological examination revealed a hypoplastic left kidney with pyelonephritic changes. The patient's left flank pain disappered and blood pressure was stable with no medication during the first postoperative month.

Discussion

Vehemeyer in 1897 first diagnosed a case by roentgen-ray examination. Since then, SIT cases have been recognized with increasing frequency.[6]

This condition is rare, presenting in about 1 individual per 20 000, and occurs due to an autosomal recessive congenital defect. It is difficult to perform surgery on thoracoabdominal organs in patients with SIT, particularly laparoscopically, because of the totally inverted position of these organs. Laparoscopic techniques, such as cholecystectomy, sigmoidectomy, gastrectomy and radical nephrectomy, have been safely applied to some kinds of surgery for SIT.[3]

Laparoscopic nephrectomy was initially applied in 1990 by Clayman and colleagues for a patient with oncocytoma. The laparoscopic techniques are increasingly used for radical or simple nephrectomy and are now standard of care in indicated patients. Because of significant pos-

Fig. 1. A computed tomography scan showing all intra-abdominal organs positioned inversely in a mirror image.

toperative pain and high morbidity associated with open approach, the use of laparoscopy for treating benign and malignant disease of the upper urinary tract has become common. The benefit of a less invasive surgical approach to urological disease is based on patient comfort, improved cosmetic results, and shorter convalescence compared to open surgery.[7,8]

Fig. 3. Chest X-ray demonstrating dextracardia .

Fig. 2. A computed tomography scan showing a left hypoplasic kidney with situs inversus totalis.

Renal anomalies, including agenesis, dysplasia, hypoplasia, ectopia, polycystic kidney, and horseshoe kidney, have been reported in SIT. Because of the association between situs inversus and cardiac, pulmonary, and renal anomalies, patient management with situs inversus and urologic disease requires careful preoperative evaluation.[2]

In the urologic field, open or laparoscopic nephrectomy, nephroureterectomy and donor nephrectomy have been reported in limited number of patients with SIT.[3] We found few articles describing laparoscopic approach in patients with SIT. The first laparoscopic nephrectomy in SIT was performed by Black and colleagues for donor nephrectomy without any complication, and they used a hand-assisted laparoscopic technique.[9] Complete laparoscopic kidney removal in a patient with SIT has been reported for a renal mass.[10] Berber and colleagues reported the first complete

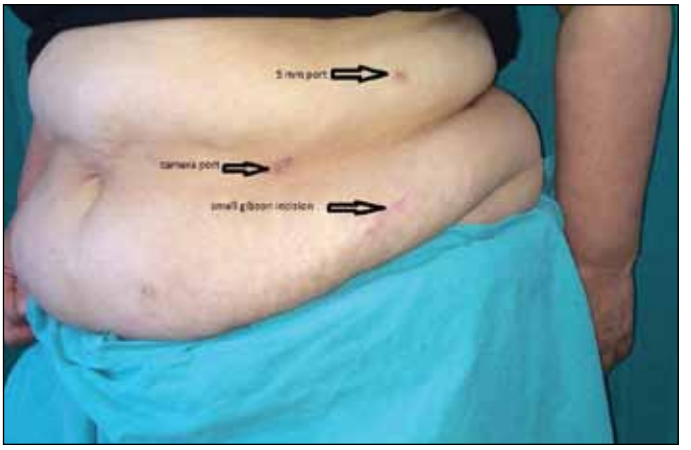

Fig. 4. Postoperative first month, laparoscopic port placement.

laparoscopic donor nephrectomy in a patient with SIT without any complication.[11] Makiyama and colleagues reported the first case of retroperitoneal nephroureterectomy for a patient with SIT by using a patient-specific simulator before surgery.[12]

By using landmarks, such as liver and spleen, anatomical orientation is more convenient in transperitoneal laparoscopic nephrectomy compared with retroperitoneal approach. However, this approach may be challenging in patients with SIT due to the unusual localization of the intra-abdominal organs.

The small left kidney had regular contours, proportional pelvic calyceal system, and cortex. A small hypoplastic kidney is a miniature type of kidney, as in the present case. However, it should be differentiated from ischaemic atrophy and reflux nephropathy. Ischaemic atrophy is characterized by a reduction in kidney size and cortical thickness; in contrast, reflux nephropathy produces dilated calyceal system and thinning in the cortex, leading to atrophic and hyperechogenic small kidneys. The association between renal hypoplasia and SIT is rare.[13]

To the best of our knowledge, this is the first reported case of a transperitoneal laparoscopic simple nephrectomy in a patient with SIT and renal hypoplasia.

Conclusion

Minimally invasive surgery is well-established for several operations in urological practice. Laparoscopy to treat benign and malignant disease of the upper urinary tract can be successfully performed for patients with SIT.

Competing interests: The authors all declare no competing financial or personal interests.

This paper has been peer-reviewed.

References

1. Michael Levin. The embryonic origins of left-right asymmetry *Crit. Rev. Oral Biol Med* 2004;15:197-206. http://dx.doi.org/10.1177/154411130401500403
2. Treiger BF, Khazan R, Goldman SM et al. Renal cell carcinoma with situs inversus totalis. *Urology* 1993;41:455-7. http://dx.doi.org/10.1016/0090-4295(93)90507-7
3. Terakawa T, Miyake H, Tanaka H, et al. Feasibility of a retroperitoneal approach as a surgical strategy for patients with situs inversus totalis: Presentation of a patient undergoing laparoscopic radical nephrectomy for renal cell carcinoma. *Int Canc Conf J* 2013;3:8-10.
4. Drover JW, Nguyen KT, Pace RF. Laparoscopic cholecystectomy in a patient with situs inversus viscerum: A case report. *Can J Surg* 1992;35:65-6.
5. Fujiwara Y, Fukunaga Y, Higashino M, et al. Laparoscopic hemicolectomy in a patient with situs inversus totalis. *World J Gastroenterol.* 2007;13:5035-7.
6. Blegen HM. Surgery in situs inversus. *Ann Surg* 1949;129:244-59. http://dx.doi.org/10.1097/00000658-194902000-00009
7. Garg M, Singh V, Sinha RJ, et al. Prospective randomized comparison of transperitoneal vs retroperitoneal laparoscopic simple nephrectomy. *Urology* 2014;84:335-9.
8. Rassweiler J, Fornara P, Weber M, et al. Laparoscopic nephrectomy: The experience of the laparoscopy working group of the german urologic association. *J Urol* 1998;160:18-21. http://dx.doi.org/10.1016/S0022-5347(01)63015-5
9. Black PC, Porter JR, Charpentier KP, et al. Hand-assisted laparoscopic right-donor nephrectomy in a patient with situs inversus. *Transplantation.* 2003;76:1530. http://dx.doi.org/10.1097/01.TP.0000071361.98583.43
10. Shapiro E, Thom M, Brandes S. Laparoscopic nephrectomy in a patient with situs inversus totalis: First reported case. *Uro Today Int J* 2010;3:1944-6. http://dx.doi.org/10.3834/uij.1944-5784.2010.06.16
11. Berber I, Gures N, Gurluler E, et al. Total laparoscopic dobor nephrectomy in situs inversus totalis: A case report. *Exp Clin Transplant* 2013;2:195-8. http://dx.doi.org/10.6002/ect.2012.0098
12. Makiyama K, Sakata R, Yamanaka H, et al. Laparoscopic nephroureterectomy in pelvic urothelial carcinoma with situs inversus totalis: Preoperative training using a patient-specific simulator. *Urology* 2012;80:1375-8. http://dx.doi.org/10.1016/j.urology.2012.08.054
13. Kaynar K, Ulusoy S, Gul S, et al. Renal hypoplasia and situs inversus totalis *Nephrology* 2005;10:189-91. http://dx.doi.org/10.1111/j.1440-1797.2005.00377.x

Correspondence: Dr. Yavuz Tarik Atik, Sakarya University Training and Research Hospital, Department of Urology, Turkey; yavuztarikatik@gmail.com