Risk factors for prolonged hospitalization in patients undergoing laparoscopic adrenalectomy

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Abstract

Introduction: *Even though laparoscopic adrenalectomy is currently a standard, there are important variations between different centres in short-term treatment results such as length of hospital stay (LOS) or morbidity.*
Aim: *To determine the factors affecting LOS in patients after laparoscopic transperitoneal lateral adrenalectomy (LTA).*
Material and methods: *The study enrolled 453 patients (173 men and 280 women, mean age 57 years) who underwent LTA between 2009 and 2017. Discharge from hospital after more than median hospital stay was considered as prolonged LOS. We evaluated factors that potentially may influence LOS (primary length of stay after surgery, excluding readmissions). Logistic regression models were used in univariate and corrected multivariate analyses, in order to identify the factors related to prolonged LOS.*
Results: *The median LOS after LTA in the studied group was 2 days. One hundred seventy-five (38.5%) patients required prolonged hospitalization. Univariate logistic regression showed that the following factors were related to prolonged LOS: presence of any comorbidity, cardiovascular disease, intraoperative complications, postoperative complications, day of the week of operation (surgery on Thursday or Friday), intraoperative blood loss, need for transfusion, hormonal activity, postoperative drainage, ASA (III–IV) and histological type – pheochromocytoma. Multivariate logistic regression showed that only complications (OR = 3.86; 95% CI: 1.84–8.04), day of the week of operation (Thursday or Friday) (OR = 4.85; 95% CI: 3.04–7.73), need for drainage (OR = 3.63; 95% CI: 1.55–8.52), and histological type – pheochromocytoma (OR = 2.48; 95% CI: 1.35–4.54) prolonged LOS.*
Conclusions: *Prolonged length of hospital stay following laparoscopic transperitoneal lateral adrenalectomy is strongly associated with the presence of postoperative complications, day of the week of operation (Thursday or Friday), need for drainage, and histological type – pheochromocytoma.*

Key words: *laparoscopy, adrenalectomy, adrenal tumour, prolonged hospitalization.*

Introduction

The gold standard for surgical treatment of adrenal tumours is laparoscopic adrenalectomy [1, 2]. Over the last two decades it has systematically replaced open procedures due to the multiple benefits of a minimally invasive approach. It has been proven that laparoscopic adrenalectomy hastens convalescence, reduces length of hospital stay (LOS) and, most importantly, lowers the morbidity rate [3, 4]. Even though laparoscopic adrenalectomy is currently a standard, there is considerable variation between different centres in short-term treatment results, such as LOS or morbidity [5]. Median LOS varies

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from 2 to 8 days, whereas morbidity rates, according to some authors, range from 4% to 23% [6–8]. All of the above prompted us to identify which factors may potentially cause these differences.

Aim

The aim of this study was to determine the factors affecting LOS in patients after laparoscopic transperitoneal lateral adrenalectomy (LTA).

Material and methods

The prospective study included consecutive patients undergoing elective laparoscopic transperitoneal adrenalectomy from 2009 to 2017 in the 2nd Department of General Surgery. Patients who initially underwent open surgery or patients with an inoperable tumour with distant metastases were excluded from the study.

Table I. Demographic analysis of patient groups

Parameter	Value
Number of patients	453
Females, *n* (%)	280 (61.8)
Males, *n* (%)	173 (38.2)
Age, mean ± SD [years]	56.68 ±13.5
ASA 1, *n* (%)	21 (4.6)
ASA 2, *n* (%)	253 (55.8)
ASA 3, *n* (%)	173 (38.2)
ASA 4, *n* (%)	6 (1.3)
Any comorbidity, *n* (%)	355 (78.4)
Cardiovascular, *n* (%)	116 (25.6)
Hypertension, *n* (%)	284 (62.7)
Diabetes, *n* (%)	126 (27.8)
Pulmonary disease, *n* (%)	63 (13.9)
Renal disease, *n* (%)	20 (4.4)
Liver disease, *n* (%)	11 (2.4)
Previous abdominal surgery, *n* (%)	209 (46.1)
Right suprarenal tumour, *n* (%)	223 (49.2)
Left suprarenal tumour, *n* (%)	230 (50.8)
Benign tumour, *n* (%)	398 (87.9)
Malignant tumour, *n* (%)	55 (12.1)
Operative time, mean ± SD [min]	97.0 ±39.0
Operative time, median (IQR) [min]	90 (70–120)
Intraoperative blood loss, mean ± SD [ml]	88.7 ±194.4
Intraoperative blood loss, median (IQR) [ml]	50 (20–70)
Conversion, *n* (%)	5 (1.1)

Our department is a tertiary referral university unit. Annually more than 700 laparoscopic procedures are performed – mainly gastric, bariatric, colorectal, pancreatic and hepatobiliary surgeries, with more than 60 cases of adrenalectomy [9, 10]. Since 2003 a laparoscopic approach has been the preferred access for adrenalectomy in our unit. However, in selected cases single access laparoscopy has been used [11, 12].

All patients had preoperative evaluation including imaging: most commonly computed tomography. In selected patients, magnetic resonance imaging (MRI) or positron emission tomography (PET) scans were performed. In all cases evaluation of the tumour's hormonal activity was performed (plasma cortisol, urinary free cortisol, aldosterone, urinary aldosterone, plasma renin activity, methoxycatecholamines and vanillylmandelic acid, adrenocorticotropin, dexamethasone suppression test, dehydroepiandrostenedione, 17-OH-progesterone, testosterone).

We evaluated factors that potentially may influence LOS (primary length of stay after surgery, excluding readmissions). Our analysis included: gender, age, body mass index (BMI), distance from patient's home to hospital, risk of anaesthesia measured with American Society of Anaesthesiologists (ASA) score, diabetes, cardiovascular disease and other comorbidities, history of previous abdominal surgery, hormonal activity, radiographic tumour size (largest diameter measured on adrenal-CT or MRI), side, histopathology and character of the tumour, operative time, day of operation (day of the week), intraoperative blood loss, complications and conversions to open surgery.

All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Written informed consent for the proposed surgical treatment was obtained from all patients before surgery.

The entire study group consisted of 453 patients (280 women and 173 men). The mean age was 57 years (18–87 years). Three hundred and ninety-eight patients were operated on for benign neoplasms, 55 for malignant tumours. The demographic analysis of the group is shown in Table I.

Statistical analysis

All data were analysed with StatSoft Statistica v.10. The results are presented as mean ± standard deviation (SD) or median with interquartile range (IQR) when appropriate. Prolonged LOS was defined as discharge from hospital after more than calculated median hospital stay. A univariate logistic regression analysis of individual demographic and perioperative parameters was undertaken to assess factors influencing prolonged LOS. Finally, the variables in the univariate logistic regression analysis that had a significant impact on the length of hospital stay were used to build a multivariate logistic regression model. Results were considered statistically significant when the *p*-value was found to be less than 0.05.

Results

The median LOS in the entire group was 2 days. Length of hospital stay was consider as prolonged if it was longer than 2 days. Only 175 (38.5%) patients required hospitalization longer than 2 days (Figure 1).

Mean operative time in the entire group was 97.0 ±39.0 min and mean intraoperative blood loss was 88.7 ±194.4 ml. Conversion was performed in 5 patients. The reasons for conversion were: adhesions after previous surgery, abnormal location of the tumour, infiltration to adjacent organs, damage to the tumour capsule and uncontrolled bleeding in 2 cases. Table II presents postoperative outcomes in the analysed group.

Table II. Postoperative outcomes in analysed groups

Parameter	Value
Patients with complications, *n* (%)	35 (7.7)
Clavien-Dindo 1, *n* (%)	19 (4.2)
Clavien-Dindo 2, *n* (%)	10 (2.2)
Clavien-Dindo 3, *n* (%)	2 (0.4)
Clavien-Dindo 4, *n* (%)	3 (0.7)
Clavien-Dindo 5, *n* (%)	1 (0.2)
Length of hospital stay, mean ± SD [days]	2.5 ±1.5
Length of hospital stay [days], median (IQR)	2 (2–3)
Readmission, *n* (%)	7 (1.5)

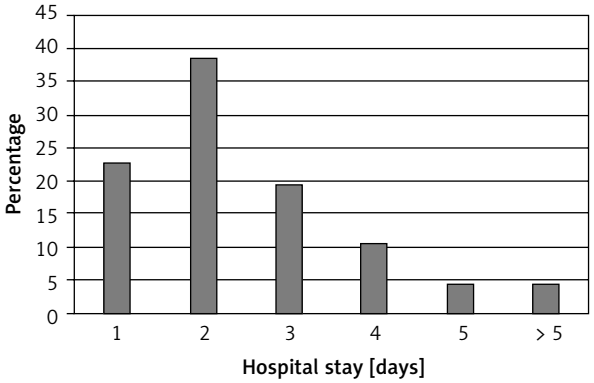

Figure 1. Length of hospital stay in analysed group

Postoperative complications occurred in 35 (7.7%) patients, with 6 (1.3%) being severe (Clavien-Dindo 3-5) (Table III). Readmission within 30 days after discharge was necessary in 7 (1.55%) patients.

Univariate logistic regression showed that: presence of any comorbidity (OR = 1.65; 95% CI: 1.02–2.68), cardiovascular disease (OR = 1.79;

Table III. Complications in analysed groups

Complications		Value
I	Surgical site infection	5
	Wound haematoma	2
	Postoperative nausea and vomiting	3
	Arrhythmia	2
	Post-operative confusion	1
	Fever	4
	Non-infectious diarrhoea	1
	C. difficile infection	1
II	Deep vein thrombosis	1
	Haemodynamic instability	4
	Pneumonia	3
	Urinary tract infection	1
	Pleural effusion	1
III	Intraperitoneal haematoma	1
	Trocar-related bleeding	1
IV	Pulmonary embolism	1
	Respiratory failure	1
	Heart infarct	1
V	Mortality	1

95% CI: 1.17–2.75), intraoperative complications (OR = 2.14; 95% CI: 1.06–4.32), postoperative complications (OR = 3.86; 95% CI: 1.84–8.04), day of the week of operation (surgery on Thursday or Friday) (OR = 3.75; 95% CI: 2.52–5.58), intraoperative blood loss (> 90 ml) (OR = 1.74; 95% CI: 1.12–2.71), need for transfusion (OR = 15.02; 95% CI: 1.89–119.61), hormonal activity (OR = 1.61; 95% CI: 1.10–2.35), need for drainage (OR = 3.52; 95% CI: 1.71–7.25), ASA (III–IV) (OR = 1.92; 95% CI: 1.31–2.83), and histological type – pheochromocytoma (OR = 1.95; 95% CI: 1.17–3.25) were related to prolonged LOS (Table IV).

Next, the multivariate logistic regression model showed that only the presence of postoperative complications (OR = 3.86; 95% CI: 1.84–8.04), day of the week (Thursday or Friday) (OR = 4.85; 95% CI: 3.04–7.73), need for drainage (OR = 3.63; 95% CI: 1.55–8.52) and histological type – pheochromocytoma (OR = 2.48; 95% CI: 1.35–4.54) were significant factors prolonging LOS. Gender, BMI, presence of previous abdominal surgery, presence of comorbidities, tumour side, and ASA had no effect on primary length of hospital stay (Table V).

Discussion

Our study showed that there are several unrelated factors affecting prolonged LOS in patients undergoing laparoscopic adrenalectomy. These factors include presence of postoperative complications, day of the week of the operation (Thursday or Fri-

Table IV. Univariate logistic regression affecting prolonged hospitalization (> 2 days)

Parameter	OR	95% CI	*P*-value
Sex (female vs. male)	0.88	0.60–1.30	0.5293
Age [years]	1.00	0.99–1.02	0.6215
BMI [kg/m^2]	0.99	0.96–1.02	0.4877
Previous abdominal surgery (yes vs. no)	1.11	0.75–1.62	0.6118
Any comorbidity (yes vs. no)	1.65	1.02–2.68	0.0418
Diabetes (yes vs. no)	1.40	0.92–2.12	0.1154
Cardiovascular disease (yes vs. no)	1.79	1.17–2.75	0.0074
Tumour site (right vs. left)	0.86	0.59–1.25	0.4235
Intraoperative complications (yes vs. no)	2.14	1.06–4.32	0.0350
Complications (yes vs. no)	3.86	1.84–8.04	0.0004
Conversion (yes vs. no)	6.48	0.72–58.46	0.0959
Day of the week	3.75	2.52–5.58	< 0.0001
Operative time (> 120 vs. ≤ 120 min)	1.49	0.98–2.24	0.0596
Need for transfusion	15.02	1.89–119.61	0.0105
Blood loss (> 90 vs. ≤ 90 ml)	1.74	1.12–2.71	0.0141
Drainage	3.52	1.71–7.25	0.0006
ASA (III–IV vs. I–II)	1.92	1.31–2.83	0.0009
Hormonal activity (yes vs. no)	1.61	1.10–2.35	0.0152
Distance from home	1.00	1.00–1.00	0.7952
Pheochromocytoma	1.95	1.17–3.25	0.0101
Tumour character (malignant vs. benign)	1.16	0.65–2.05	0.6146
Size of the tumour [cm]	1.05	0.97–1.14	0.2150

Table V. Multivariate logistic regression affecting prolonged hospitalization (> 2 days)

Parameter	OR	95% CI	*P*-value
Any comorbidity (yes vs. no)	1.15	0.63–2.11	0.6519
Cardiovascular disease (yes vs. no)	1.31	0.73–2.36	0.3667
Day of the week	4.85	3.04–7.73	< 0.0001
Hormonal activity (yes vs. no)	1.34	0.85–2.13	0.2117
Intraoperative complications (yes vs. no)	0.95	0.27–3.31	0.9329
Complications (yes vs. no)	3.86	1.84–8.04	< 0.0001
Need for transfusion	7.55	0.58–98.76	0.1233
Blood loss (> 90 vs. ≤ 90 ml)	1.26	0.62–2.55	0.5180
Need of drainage	3.63	1.55–8.52	0.0031
ASA (III–IV vs. I–II)	1.42	0.82–2.46	0.2060
Pheochromocytoma	2.48	1.35–4.54	0.0133

day), need for drainage, and histological type of the tumour – pheochromocytoma.

Median LOS in our study group was 2 days. Only 38.5% of the patients required hospitalization longer than 2 days, which we set as the cut-off point for stating prolonged LOS. More than 61.3% of patients were discharged on postoperative day 1 or day 2. Similar LOS was reported by Karabulut *et al.* and Pineda-Solis *et al.*, whereas Shi *et al.* and Wang *et al.* report their LOS to be 5–6 days [7, 8, 13, 14]. Such short hospital stays in our unit are the result of several factors. First of all, our department is part of tertiary referral university hospital with a high annual volume of laparoscopic adrenalectomies (around 60 per year). In a previously published study, based on 500 adrenalectomies performed in our unit, it was proven that both surgical experience and perioperative care lead to reduced LOS [15]. Secondly, over the years the perioperative care has improved, which also affected the outcomes [16–19].

Length of hospital stay is inextricably related to the extent of the surgery and the patient's general condition in the postoperative period. The classical approach and the occurrence of complications are undoubtedly reasons for prolonged hospital stay. Most cases of open adrenalectomy require a much longer hospital stay, and discharges after 24 to 48 h are rare. Due to the fact that since 2003 almost all adrenalectomies have been performed with minimally invasive access, open procedures are performed mainly in cases of conversion. The conversion rate in our group was relatively low (1.1%). In addition, there was a small proportion of patients operated on using single access. We did not observe any shortening of LOS despite the reduction of the number of trocars. It seems that the only benefit of the approach is a minor cosmetic improvement, but at the cost of a longer operative time [20, 21]. Therefore this technique still remains questionable. Another factor quite obviously related to prolonged LOS is complications. On the other hand, the rate of severe complications in our group was relatively low. Therefore, we tried to determine which other factors (demographic and perioperative) may allow prediction of the necessity for prolonged hospitalization.

We observed that the histological type of the tumour being pheochromocytoma affects the length of hospital stay, which was proven in the multivariate logistic regression model. These patients require special care in the perioperative period. The morbidity rate is greater and ranges from 5% to 23% [22]. In addition, surgery for pheochromocytoma is considered more difficult compared to other tumours [23]. The most important complication in this study group is haemodynamic instability in the perioperative period [24]. It may often require catecholamine infusion, even up to several days after the surgery. Similar conclusions, regarding LOS in patients with pheochromocytoma, were drawn by other authors. Conzo *et al.* reported LOS of 4 days, Kim *et al.* almost 6 days and Gagner *et al.* over 8 days [6, 25, 26]. On the other hand, Kercher *et al.* reported a short time

of hospitalization, 2 to 3 days, and a relatively low morbidity rate of 4% [27]. Similar short LOS were reported by Cheah *et al.* and Jaroszewski *et al.* [28, 29]. Such vast diversity in LOS is mainly caused by the differences in reported complication rate, including the most important one – haemodynamic instability. Some authors have reported that patients with different hormonal activity of the tumours such as patients with Cushing syndrome, who require steroid supplementation in the perioperative period, may have prolonged hospitalization. In most cases, early introduction of an oral diet, early mobilization and optimal analgesic protocol allow hospitalization to be shortened, while steroid supplementation is continued after discharge orally.

Another factor significantly prolonging hospitalization is postoperative drainage. It is not routinely used in our centre, which supports the idea of modern perioperative care. In one study, Major *et al.* showed that drainage after laparoscopic adrenalectomy is not only unnecessary, but may also be associated with an increased risk of complications [30]. In our unit the use of drains was justified only when there was an increased risk of postoperative bleeding, and they were removed as soon as possible.

The last factor significantly extending LOS was the day of the week on which the surgery was performed. The operation being on Thursday and Friday was related to a longer stay as a result of the reluctance to discharge patients during the weekend.

Intraoperative blood loss and duration of surgery were the next possible factors prolonging LOS. However, the multivariate regression model revealed that these factors had no significant impact. It may seem that these parameters are associated with intraoperative difficulties, which in turn may increase the risk of complications. Because of that, the multivariate regression model shows that the morbidity has a significant impact on the length of hospital stay.

Our study has limitations associated with the single centre design. Another limiting factor is the fact that throughout this period, the perioperative care protocol in our unit has been modified and the proficiency in laparoscopic surgery has increased. These factors may bias our results.

Conclusions

Our study has proven that the tumour histological type being pheochromocytoma, postoperative complications, operation at the end of the week (on Thursday or Friday), and the need for drainage may cause prolonged LOS in patients undergoing laparoscopic adrenalectomy.

Conflict of interest

The authors declare no conflict of interest.

References

1. Smith CD, Weber CJ, Amerson JR. Laparoscopic adrenalectomy: new gold standard. World J Surg 1999; 23: 389-96.
2. Pędziwiatr M, Natkaniec M, Kisialeuski M, et al. Adrenal incidentalomas: should we operate on small tumors in the era of laparoscopy? Int J Endocrinol 2014; 2014: 658483.
3. Jacobs JK, Goldstein RE, Geer RJ. Laparoscopic adrenalectomy. A new standard of care. Ann Surg 1997; 225: 495-501; discussion 501-2.
4. Gagner M. Laparoscopic adrenalectomy. Surg Clin North Am 1996; 76: 523-37.
5. Pędziwiatr M, Matłok M, Kulawik J, et al. Laparoscopic adrenalectomy by the lateral transperitoneal approach in patients with a history of previous abdominal surgery. Videosurgery Miniinv 2013; 8: 146-51.
6. Gagner M, Breton G, Pharand D, Pomp A. Is laparoscopic adrenalectomy indicated for pheochromocytomas? Surgery 1996; 120: 1076-9; discussion 1079-80.
7. Karabulut K, Agcaoglu O, Aliyew S, et al. Comparison of intraoperative time use and perioperative outcomes for robotic versus laparoscopic adrenalectomy. Surgery 2012; 151: 537-42.
8. Pineda-Solís K, Medina-Franco H, Heslin MJ. Robotic versus laparoscopic adrenalectomy: a comparative study in a high-volume center. Surg Endosc 2013; 27: 599-602.
9. Natkaniec M, Dworak J, Pędziwiatr M, et al. Patients criteria determining difficulty of the laparoscopic lateral transperitoneal adrenalectomy. A retrospective cohort study. Int J Surg 2017; 43: 33-7.
10. Pędziwiatr M, Major P, Pisarska P, et al. Laparoscopic transperitoneal adrenalectomy in morbidly obese patients is not associated with worse short-term outcomes. Int J Urol 2017; 24: 59-63.
11. Budzyński A, Matłok M, Pędziwiatr M, et al. SILS (single incision laparoscopic surgery) – new surgical approach to peritoneal cavity. Adv Med Sci 2011; 56: 18-24.
12. Budzynski A, Pędziwiatr M, Matłok M, et al. Preliminary experience with transperitoneal single incision laparoscopic surgery adrenalectomy. Videosurgery Miniinv 2010; 5: 87-92.
13. Shi TP, Zhang X, Ma X, et al. Laparoendoscopic single-site retroperitoneoscopic adrenalectomy: a matched-pair comparison with the gold standard. Surg Endosc 2011; 25: 2117-24.
14. Wang L, Liu B, Wu Z, et al. Comparison of single-surgeon series of transperitoneal laparoendoscopic single-site surgery and standard laparoscopic adrenalectomy. Urology 2012; 79: 577-83.
15. Pędziwiatr M, Wierdak M, Ostachowski M, et al. Single center outcomes of laparoscopic transperitoneal lateral adrenalectomy – lessons learned after 500 cases: a retrospective cohort study. Int J Surg 2015; 20: 88-94.

16. Zeiger MA, Thompson GB, Duh QY, et al. The American Association of Clinical Endocrinologists and American Association of Endocrine Surgeons medical guidelines for the management of adrenal incidentalomas. Endocr Pract 2009; 15 Suppl 1: 1-20.
17. Conzo G, Pasquali D, Della Pietra C, et al. Laparoscopic adrenal surgery: ten-year experience in a single institution. BMC Surg 2013; 13 Suppl 2: S5.
18. Pędziwiatr M, Matłok M, Kisialeuski M, et al. Short hospital stays after laparoscopic gastric surgery under an Enhanced Recovery After Surgery (ERAS) pathway: experience at a single center. Eur Surg 2014; 46: 128-32.
19. Kisialeuski M, Pędziwiatr M, Matłok M, et al. Enhanced recovery after colorectal surgery in elderly patients. Videosurgery Miniinv 2015; 10: 30-6.
20. Pędziwiatr M, Matłok M, Major P, et al. Laparoscopic surgery of the spleen through single umbilical incision. Videosurgery Miniinv 2013; 8: 8-12.
21. Kokorak L, Soltes M, Vladovic P, Marko L. Laparoscopic left and right adrenalectomy from an anterior approach – is there any difference? Outcomes in 176 consecutive patients. Videosurgery Miniinv 2016; 11: 268-73.
22. Shen WT, Grogan R, Vriens M, et al. One hundred two patients with pheochromocytoma treated at a single institution since the introduction of laparoscopic adrenalectomy. Arch Surg 2010; 145: 893-7.
23. Natkaniec M, Pędziwiatr M, Wierdak M, et al. Laparoscopic adrenalectomy for pheochromocytoma is more difficult compared to other adrenal tumors. Videosurgery Miniinv 2015; 10: 466-71.
24. Pisarska M, Pędziwiatr M, Budzyński A. Perioperative hemodynamic instability in patients undergoing laparoscopic adrenalectomy for pheochromocytoma. Gland Surg 2016; 5: 506-11.
25. Conzo G, Musella M, Corcione F, et al. Laparoscopic adrenalectomy, a safe procedure for pheochromocytoma. A retrospective review of clinical series. Int J Surg 2013; 11: 152-6.
26. Kim HH, Kim GH, Sung GT. Laparoscopic adrenalectomy for pheochromocytoma: comparison with conventional open adrenalectomy. J Endourol 2004; 18: 251-5.
27. Kercher KW, Novitsky YW, Park A, et al. Laparoscopic curative resection of pheochromocytomas. Ann Surg 2005; 241: 919-26; discussion 926-8.
28. Cheah WK, Clark OH, Horn JK, et al. Laparoscopic adrenalectomy for pheochromocytoma. World J Surg 2002; 26: 1048-51.
29. Jaroszewski DE, Tessier DJ, Schlinkert RT, et al. Laparoscopic adrenalectomy for pheochromocytoma. Mayo Clin Proc 2003; 78: 1501-4.
30. Major P, Matłok M, Pędziwiatr M, et al. Do we really need routine drainage after laparoscopic adrenalectomy and splenectomy? Videosurgery Miniinv 2012; 7: 33-9.

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