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CLINICAL RESEARCH

Laparoscopic Gastric Banding in Over 60s

Anthony Clough · Laurent Layani · Abha Shah · Lucas Wheatley · Craig Taylor

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Abstract
Background The aggressive pursuit of weight loss in the elderly remains a controversial objective. In this series of 113 patients over 60 years of age who underwent laparoscopic gastric banding surgery, we report on complications, co-morbidity change, quality-of-life improvement and changes in medication use over a median follow-up period of 25.5 months.
Methods A prospectively kept database was reviewed from January 1999 to September 2008 identifying patients over 60 who underwent gastric banding surgery. Baseline and follow-up SF-36® survey scores were compared longitudinally. Co-morbidity change and medication use were assessed by questionnaire and electronic record review.
Results Major complications were experienced by 7.1% over the follow-up period with a re-operation rate of 15.0%. Excess BMI loss was 44.1% after 5 years and combined mean SF-36® quality-of-life scores (out of 100) improved 22.1 points, achieving parity with age-matched norms for the general population. Diabetes improved in 74.2% with hypertension, hyperlipidaemia and depression improving in 57.1, 51.1 and 35.9% of cases. A significant drop in medication use was not seen, and cancer was responsible for three deaths over the follow-up period. No surgical mortality was incurred.
Conclusion Laparoscopic gastric banding can markedly improve quality of life for morbidly obese over 60s. Health gains are significant, but medication use is not substantially altered. Gastric banding is an ideal weight loss operation for this age group due to its safety and efficacy, and the primary goal should be quality-of-life improvement.

Keywords Gastric banding · Longevity · Obesity · Obese · Elderly · Over 60 · Weight loss · Quality of life · Bariatric surgery

A. Clough (✉)
John Flynn Hospital,
Tugun, QLD, Australia
e-mail: adclough@bigpond.com

L. Layani
Australian Institute of Weight Control,
John Flynn Private Hospital,
Tugun, QLD, Australia
e-mail: laurent45@mac.com

A. Shah · L. Wheatley
Faculty of Health Sciences and Medicine, Bond University,
Gold Coast, QLD, Australia

A. Shah
e-mail: abhas@y7mail.com

L. Wheatley
e-mail: lucas@wheatleynet.com

C. Taylor
The San Clinic & Concord Hospital,
Sydney, Australia
e-mail: taylor_c@mac.com

Introduction

Over 20% of Australians aged over 60 are obese [1] (body mass index (BMI)≥30 kg/m^2), and in the United States this figure has been quoted at over 35% [2]. These numbers are likely to rise in the foreseeable future [3] as will the proportion of the population over 65 in these countries and many others [4]. Obesity is a major contributor to the metabolic syndrome, obstructive sleep apnoea, arthritis, psychosocial dysfunction, urinary incontinence and several types of cancer [5].

Whilst surgery for weight loss is an accepted intervention for selected individuals, it remains a controversial area

for the elderly with goals less easily defined than those of younger patients. Weight loss can be associated with decreased lean body mass and bone demineralisation, which may predispose to hip fracture in older patients [5]. A high BMI may even be protective in some patients, for example, those with congestive heart failure according to recent publications [6]. McTigue et al. [7] are of the opinion that no amount of weight loss will allow older patients to forgo all pharmacotherapy for their cardiovascular risk factors.

But many overweight elderly have trouble performing basic personal activities such as bending over, managing stairs, carrying groceries, showering and maintaining personal hygiene. Obesity accelerates lower limb arthritis [5], which impacts on flexibility and general mobility. These physical impediments threaten independence and effective social functioning.

Whilst a number of studies demonstrate significant quality-of-life (QOL) improvements in younger cohorts after laparoscopic gastric banding (LGB) surgery [8–14], there is less information available on QOL changes specific to elderly patients after this operation. It would be useful to know that QOL gains and co-morbidity improvements can still be achieved in elderly patients with LGB, who are likely to lose less excess weight from surgery than their younger counterparts [3, 15–17].

This study updates our previous series of patients over 60 undergoing LGB surgery [18] and is one of the largest published series to date looking at bariatric surgery in this age group.

Methods

A single surgeon's (Dr Layani) clinic and hospital records were examined between 1999 and 2008 to identify any patient who had received LGB surgery over 60 years of age. As well as these records, the LapBase® (Accessmed, Melbourne) bariatric database was searched. A subject was included in the banded group if they were over 60 years of age at the time of LGB surgery and had at least 3 months follow-up since the time of operation.

We collected information on demographics, baseline co-morbidities, hospital and ICU stay, BMI and medications. Early and late complications were assessed from clinic records, hospital charts, questionnaire and interview in some cases. A baseline SF-36® QOL questionnaire was available for all subjects attending the clinic from 2003 onwards.

Gastric banding was performed laparoscopically in every case, and the pars flaccida technique was used. Both the Lap-Band System (Inamed/Allergan, Irvine, CA) and the Swedish adjustable gastric band (SAGB®, Obtech, Ethicon Endo-Surgery) were used in about equal proportions, with the SAGB® system in use almost exclusively during the last 2 years of the study. Patients who had bands removed at a later date were not excluded for the purpose of statistical analysis.

All patients were sent a follow-up SF-36® QOL questionnaire and a purpose-designed Wellbeing Questionnaire to document co-morbidity changes, medications, weight and questions relating to success of the band. Co-morbidity improvement or decline was assessed by self-report and by change in medication use. SF-36® QOL scores for eight categories were compared against published norms in the non-obese, well population of similar age. Subjects failing to return questionnaires were contacted by phone where possible and invited to complete the questionnaires verbally. The Registries of Births, Deaths and Marriages in the states of Queensland and New South Wales performed death record searches for all uncontactable patients.

Statistical Analysis

SF-36® response variables were not normally distributed, and the Wilcoxon signed-rank test for dependent samples was utilised to compare baseline to follow-up values. All statistical analyses and graphs were produced using Microsoft® Office Excel® 2007 with the add-in software WinSTAT® for Microsoft Excel®. All analyses were performed at a significance level of $p=0.05$.

Results

Baseline Characteristics

Over the period 1999–2008, 113 patients over 60 years of age underwent gastric banding under a single surgeon (Table 1).

Table 2 lists the baseline co-morbidities and numbers of medications taken with reference to each disorder. Median follow-up time was 25.5 months with a range of 3–97. Seventeen patients had follow-up times over 5 years.

Table 1 Baseline characteristics

Characteristic	Band group
Total number	113
Mean age (years)	63.6 (60–73)
Mean weight (kg)	116.9
Mean BMI (kg/m^2)	42.2
Median follow-up (months)	25.5
Male:female ratio	0.77

Table 2 Baseline co-morbidities

Co-morbidity	Proportion	Meds taken per patient[a]
Baseline co-morbidity details available	104/113 (92%)	
Diabetics (all type II)	35/104 (33.7%)	0.35
Diabetics on insulin	5/104 (4.8%)	0.05
Hypertension	76/104 (73.1%)	1.15[b]
Sleep apnoea	15/104 (14.4%)	
Hyperlipidaemia	50/104 (48.1%)	0.42
Depression	20/104 (19.2%)	0.22
Reflux	49/104 (47.1%)	0.25
Suffer back pain	64/104 (61.5%)	
Suffer hip/knee pain	69/104 (66.3%)	

[a] Mean number of medications per patient taken for this co-morbidity; all patients with available baseline medication information form denominator

[b] Antihypertensive and cardiac meds considered in one group

Complete follow-up surveys were obtained from 85/113 (75.2%) subjects, 6/113 (5.3%) declined to respond, leaving 22/113 (19.5%) un-contactable for follow-up.

Early and Late Complications

Complications from surgery are detailed in Table 3. Mean length of inpatient stay was 1.7 post-op days (range 0–11) with ten patients (9.7%) spending at least 1 day in intensive care or a high dependency unit. All major complications were resolved satisfactorily apart from one patient with recurrent aspiration pneumonia who eventually needed the band removed. Port-related issues made up approximately half of the minor complications. Medical complications such as post-op arrhythmia were uncommon, totalling 4.4% overall.

Over the follow-up period, 7/113 (6.2%) patients had their band removed. Of these, five removals were for general band intolerance without a specific reversible complication. There was no early mortality.

Weight Loss

Fig. 1 shows weight loss over time. At 1 year, %EBMIL was 43.3% and remained steady from that time. At 6 years, %EBMIL was 44.1% (n=16) or a 23.2-kg weight loss in absolute terms.

Table 3 Complications from gastric banding surgery

Complication	Total number	Subjects with at least one complication	Complications per subject affected
Any complication	34	21/113 (18.6%)	1.6
Major complications	10	8/113 (7.1%)	1.3
Slipped band—re-operation (2)			
Gastric obstruction—re-operation (2)			
Duodenal fistula			
Colonic fistula			
Acute gastric dilatation			
Cardiac arrhythmia—ablation procedure			
Recurrent aspiration pneumonia			
Pulmonary embolus			
Medical complications	5	5/113 (4.4%)	1.0
Arrhythmia (2)			
Aspiration pneumonia			
Pulmonary embolus			
Unstable diabetes			
Minor complications	24	17/113 (15.0%)	1.4
Port infections	5	5/113 (4.4%)	1.0
All port-related complications	12	8/113 (7.1%)	1.5
All infectious complications	7	7/113 (6.2%)	1.0
Total re-operations related to banding	30	17/113 (15.0%)	1.8

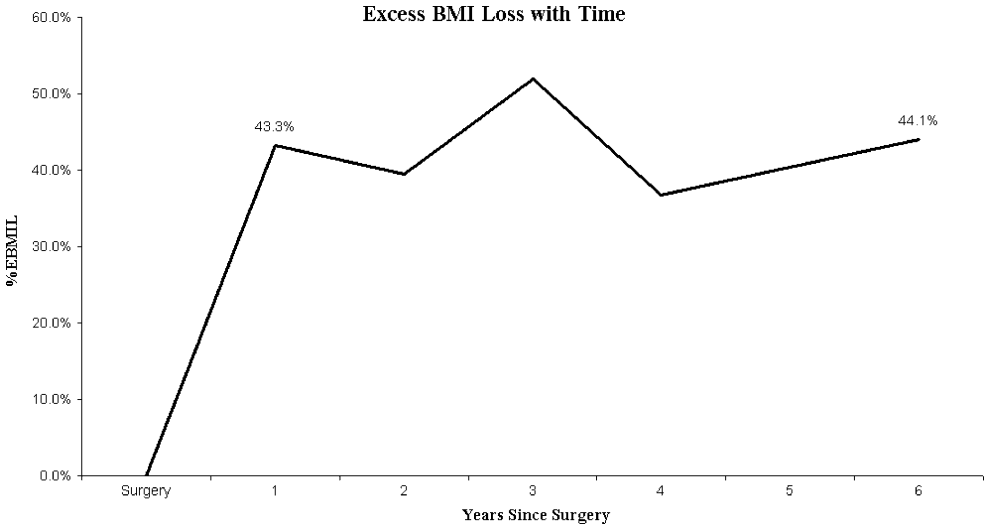

Fig. 1 Percentage excess BMI loss with time

Quality-of-Life Data

Fig. 2 shows changes in SF-36® survey scores for all eight domains from baseline to follow-up. The third horizontal column (clear) in each set represents published Australian SF-36® norms for non-obese individuals 55–64 years [19]. There is marked improvement in all four physical function-related parameters as well as "General Health", and approximate parity with published norms is achieved in all cases.

Two scored SF-36® categories refer to mental and emotional health. "Role-Emotional" demonstrated a particularly large improvement with mean scores moving from 58.5 to 89.6 (population norm 80.3) at follow-up. "Mental Health" scores also increased above published norms.

A healthy improvement is likewise seen in the one scored parameter related to "Social Functioning".

We asked subjects to rate whether their "Self-Esteem", "Outlook on Life" and "Depression" had changed over time (Fig. 3). "Self-Esteem" and "Outlook on Life" improved in 50.0 and 63.8% of band cases, respectively whilst "Depression" improved in 35.9%. The proportion of patients on anti-depressants dropped from 21.0 to 16.3%.

Back and lower limb pain were common ailments in this group, affecting approximately two thirds of the baseline cohort. Back pain was "Better" or "Much Better" in 42.0% of the band group on follow-up and hip/knee pain improved in 34.0%.

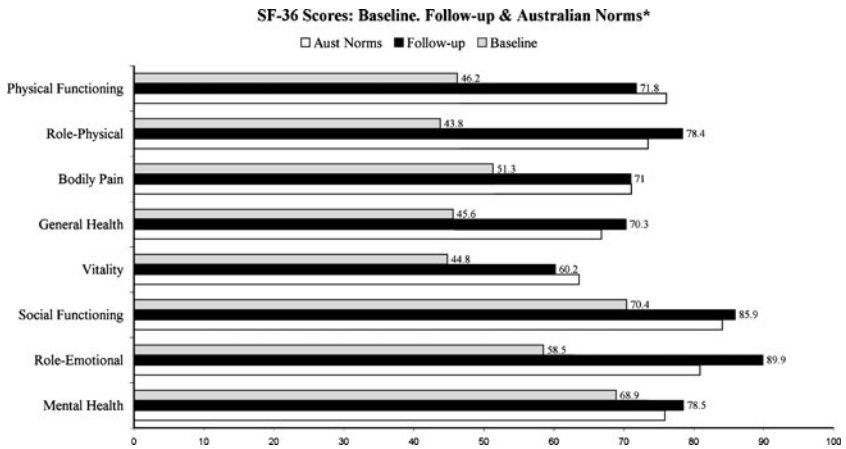

Fig. 2 SF-36® quality-of-life questionnaire results, before and after surgery with comparison to age-matched Australian norms. Scores are out of 100, with 100 representing best QOL function for the patient. *Light columns* represent baseline scores, *dark columns* at follow-up. *Clear columns* represent Australian SF-36® norms for non-obese individuals 55–64 years. Tests for significance are from baseline scores to follow-up. *P* values calculated using the Wilcoxon test for dependent samples. *All baseline to follow-up score differences are statistically significant at a level of $p<0.001$ except for "Mental Health", (0.014), and "Social Functioning", (0.004). Australian Norms are for a standard cross section of the normal population aged 55–64 years

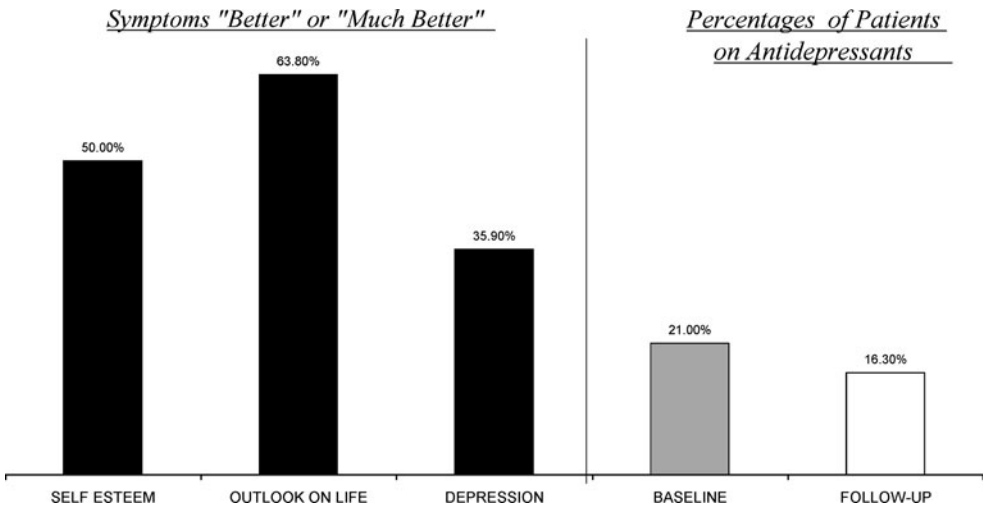

Fig. 3 Changes in self-esteem, outlook on life, depression and anti-depressant use over time

Co-morbidity Changes

Table 4 shows self-reported improvements or deteriorations in co-morbid conditions with follow-up, as well as qualitative and quantitative changes in medication use. Of diabetics, 74.2% reported improvement in their condition, with 46.7% altogether reporting "Much Better" and 43.8% of diabetics were using less diabetic medications. Approximately half of affected patients reported improvement in their hypertension, hyperlipidaemia, sleep apnoea or other respiratory condition.

Apart from diabetics, in whom 43.8% of patients reported using less medication (and 18.8% *more* medication), there was not a marked drop in medication use in either group. When assessed quantitatively, the mean number of medications per patient for diabetes used actually increased from 0.35 to 0.43, although drug dosages were not taken into account, and the difference was not statistically significant.

Over the follow-up period three patients died, all due to cancer.

Satisfaction

Subjects were asked how happy they were that they underwent banding surgery (Fig. 4). When asked whether they would recommend the band to other obese patients over 60, 92.1% said "yes".

Discussion

This is a case series produced from prospectively kept records and a bariatric database with longitudinal follow-

Table 4 Self-reported change in co-morbidities and medication use with time

Co-morbidity	Improved (%)	Deteriorated (%)	Less meds[a] (%)	More meds[b] (%)	Mean number of meds[c]	
					Baseline	Follow-up*
Diabetes	74.2	12.9	43.8	18.8	0.35	0.43
Hypertension	57.1	5.4	13.2	14.5	1.15[d]	1.05[d]
Sleep apnoea	47.1	3.9				
Hyperlipidaemia	51.1	4.3	10.7	17.8	0.42	0.41
Reflux	35.9	15.4	25.0	25.0	0.25[e]	0.10[e]
Asthma/COAD	44.8	6.9				

"Improved" is the sum of responses "Better" and "Much Better". "Deteriorated" is the sum of responses "Worse" and "Much Worse"

[a] Percentage of patients who indicated they "Use Less" or have "Stopped Taking" medications for the condition on follow-up

[b] Percentage of patients who indicated they "Use More" or take "New" medications for the condition on follow-up

[c] Mean number of medications for the co-morbidity taken per patient without consideration as to dosages. Denominators represent all patients with available medication information, whether or not they have the listed co-morbidity

[d] Anti-hypertensives and cardiac medications considered in one group

[e] Proton pump inhibitors or H_2-receptor antagonists

*p values are all non-significant comparing baseline to follow-up for medication use

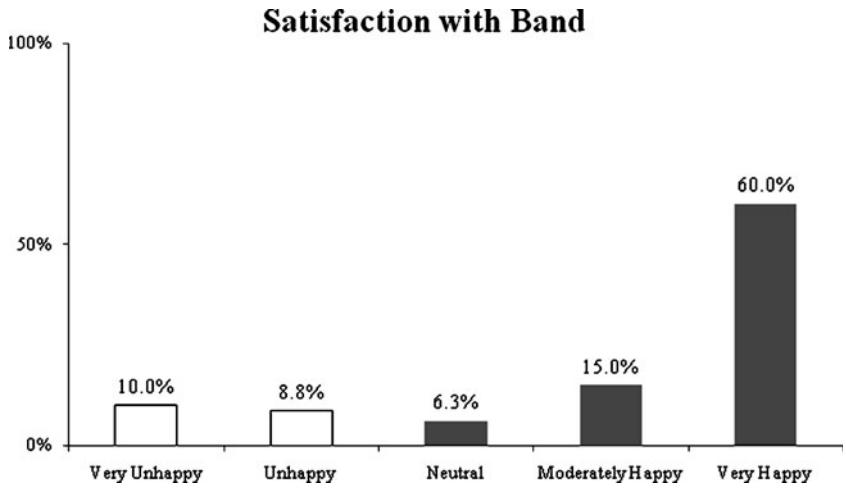

Fig. 4 Overall band satisfaction

up. Good quality baseline information was available including SF-36® QOL surveys on each patient since 2003.

Quality of Life

Marked improvement in QOL after LGB surgery in the obese elderly is the key positive finding of this study.

QOL gains were seen in all eight categories of the SF-36® with banded patients achieving parity with published population norms for non-obese individuals [19]. These marked QOL gains were seen in this elderly cohort group despite achieving EBMIL of less than 50%. The effect of LGB on reducing depression and improving self-esteem has been well documented [20–22], and this effect holds true in the elderly according to our data. Back and lower limb pain, common maladies in this age group, improved significantly.

Weight Loss and Health

It is not surprising that excess weight loss after bariatric surgery in the elderly is less than in younger cohorts [20, 23]. These patients are usually retired from work and frequently have lower limb arthritis or medical problems which preclude heavy exercise. At least one patient in this study was confined to a wheelchair. Those patients admitting to Hip/Knee pain at baseline appeared to lose less weight than those free of pain (mean %EBMIL of 42.5 vs. 52.5%, $p=0.064$).

Co-morbidity change is in line with previous studies showing significant improvements in diabetes, hypertension, hyperlipidaemia and sleep apnoea after LGB [8, 15, 20]. However, there did not appear to be a substantial decrease in medication use after surgical intervention. It is difficult to know how to interpret this in light of considerable self-

Table 5 Reported complications after gastric banding surgery in the elderly

Study	Year	Age studied (years)	Number	Major[a] (%)	Minor[b] (%)	Mortality[c] (%)
Nehoda et al. [26]	2001	≥50	68	1.4	8.7	0
Silecchia et al. [24]	2005	≥55	24	4.2	4.2	0
Varela et al. [27]	2006	≥60	96	<4.2	N/A	0
Taylor et al. [15][d]	2006	≥60	40	2.5	5.0	0
Busetto et al. [16][e]	2008	≥60	216	3.4	N/A	0.46
Mittermair et al. [25]	2008	≥60	27	0.0	22.2	0
		50–59	107	3.7	27.1	0
Clough et al. (this study)		≥60	113	7.1	15.0	0

Long-term issues such as oesophageal or pouch dilatation or oesophagitis have not been included in this table

[a] Includes band slippage, migration, obstruction, perforation, severe sepsis, and severe medical complication

[b] Includes port-related complications, minor infections, and minor postoperative issues

[c] Death within 30 days

[d] Data overlaps with this study

[e] Only complications requiring major revisional surgery reported

reported improvements. Despite losing weight after surgery, patients continue to age and we presume that it is more difficult to dispense with medications as the seventh and eight decades are reached. Many elderly patients with *normal* BMIs take numerous tablets.

Safety and Complications

In this elderly group, despite high levels of co-morbidity, medical complications were uncommon (4.4%). ICU stay was short when required, and overall hospital stay averaged less than 2 days.

A small number of studies exist detailing complication rates after LGB specific to elderly patients (see Table 5) ([15, 18, 24–26, 29]). Major complication rates are usually reported at <5% with minors from 5 to 25%. Taking all studies together with the exclusion of Taylor et al. (patients overlap with this study), an overall mortality rate of 1/651 (0.15%) can be simplistically estimated for LGB surgery in patients over 50 years of age, with at least 70% of these patients actually over 60 years. The single reported mortality from Busetto et al. was due to massive pulmonary embolism in a patient with dilated cardiomyopathy.

A similar number of reports are available looking at Roux-en-Y Gastric Bypass (RYGB) in the elderly including case series with $n<100$ [3, 16, 27, 28] and two nationwide reviews [29, 30] both with $n>1{,}300$. In the smaller series, early and late major complications range from 6.1% to over 15% and mortality of 0 to 1.6%. In the larger reviews, bariatric surgery was considered as a whole with the majority of cases RYGB. Mortality for the elderly ranges from 0.7 to 4.8%, although a subset of 300 RYGB performed between 2004 and 2005 produced 0% mortality.

Given the impressive QOL improvements from LGB demonstrated in this paper, any further benefits bestowed by more complex operations may be offset by the surgical risk faced by this age group. Aggressively pursuing greater degrees of weight loss in this demographic is unlikely to translate into improvements in longevity and may not decrease the need for medication as much as in younger groups.

Further Comments

Elderly patients seeking weight loss surgery are different from younger patients, with higher rates of co-morbidities, reduced exercise potential and less prospective life span. The decision to offer bariatric surgery in these patients is complicated by findings in several studies of a possible protective role of excess fat in some demographics. Weight loss is associated with a decrease in lean body mass and may decrease bone mineralisation and predispose patients to fracture. We recommend that any elderly patient choosing to undergo bariatric surgery do so only after careful discussion and incorporation of a tailored diet and exercise programme with a primary focus on quality-of-life improvement.

Conclusion

Laparoscopic gastric banding in appropriately selected obese patients over 60 years of age can markedly improve quality of life in each of physical, mental, emotional and social contexts. The procedure is safe and well tolerated in this age group and leads to improvements in medical co-morbidities, although significant medication reduction was not shown in this study. We believe that laparoscopic gastric banding is the most appropriate bariatric procedure for this age group due to its inherent safety and proven efficacy.

Conflicts of Interest None.

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