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UPPER GIT SURGERY

Why some peptic oesophageal strictures persist: risk factors of recalcitrancy from a South African cohort

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Background: Peptic strictures (PSs) result from excessive oesophageal acid reflux and are a common benign cause of dysphagia. A scarcity of local data is available as regards identifying risk factors associated with recalcitrancy.
Methods: Single-centre retrospective audit of PS undergoing endoscopic management between 1 March 2018 and 1 March 2022, aiming to identify recalcitrancy risk factors.
Results: Of 69 patients, 37 were male, (53.4%) and 27 (39.1%) were diagnosed with recalcitrant strictures. Most strictures were distal (53, 76.8%) with an associated hiatus hernia in 52 (75.4%). While comorbidities were not associated with recalcitrancy, younger age was a risk factor with recalcitrant stricture group median age of 51 (IQR 38.5–61.0 years) versus non-recalcitrant group median age of 62.5 (IQR 48.5–70.8 years; $p = 0.044$). Although HIV status did not affect recalcitrancy risk, taking oral antiretrovirals (ARVs) was significantly associated with recalcitrancy ($p = 0.032$; OR 4.55 [95% CI 1.06–19.51]).
Presenting degree of dysphagia ($p < 0.001$; OR 16 [95% CI 3.34–76.65]), requiring > 3 dilatations ($p < 0.001$) and smaller index residual oesophageal lumen ($p < 0.001$) were all significantly associated with recalcitrancy. Fourteen patients were temporarily stented (having a total of 24 stents placed). Thirteen patients had post-endoscopic complications with most of these complications occurring amongst the recalcitrant group ($n = 11$). There was a 2.3% immediate endoscopy intervention complication rate (total 265 oesophageal dilatations) and there were two mortalities in the cohort (one from suspected aspiration pneumonia and one from a suspected missed oesophageal perforation).
Conclusion: Peptic stricture recalcitrancy is common in our setting and an association with taking antiretroviral medication was a novel finding in this study.
Keywords: benign oesophageal stricture, recalcitrant stricture, risk factors for recalcitrancy

Introduction

Peptic oesophageal stricturing is defined as a narrowing of the oesophageal lumen due to uncontrolled gastro-oesophageal reflux disease (GORD) resulting in chronic inflammation.[1] Fibrous tissue deposition and collagen lead to scarring and stricture formation.[2-4] Peptic strictures (PSs) remain the most common benign oesophageal strictures but have been declining in incidence over the past 20 years due to increasing use of proton pump inhibitors (PPI).[1,2] Refractory or recurrent PSs, which have been previously specifically defined, remain a significant management challenge.[2,5-8] Approximately 90% of benign oesophageal strictures are dilated successfully after 3–5 dilatations without needing further intervention.[8-10] The remaining 10% are refractory or recurrent strictures, requiring a longer course of treatment, increasing the risk of iatrogenic complications, nutritional deficits and economic burden to the healthcare system.[2]

Predictors of recurrence of benign oesophageal strictures include symptom persistence (dysphagia and heartburn) despite management, a narrow index diameter of the stricture (diameter of less than 9 mm), female sex, aetiology of the stricture and achieving maximum stricture diameter of 13–15 mm during the first 3 endoscopic dilatation interventions.[2,9,11,12] Dysphagia to solids only occurs when there is a substantial oesophageal luminal compromise with a residual lumen of 18 mm usually remaining asymptomatic.[13]

The mainstay investigation for oesophageal strictures remains upper gastrointestinal endoscopy that allows defining the characteristics of the stricture, therapeutic interventions and excluding concurrent pathology.[4,5,8,12,14] Endoscopy should be augmented with fluoroscopy to better define the anatomy of complex strictures. Formal contrast swallow examination, manometric studies for exclusion of coexisting motility disorders and, occasionally, cross-sectional imaging may be required when investigating recalcitrant strictures.

While management is multimodal, adequate continued acid suppressive therapy with PPI is essential, with endoscopic intervention required to achieve and maintain oesophageal luminal patency.[1-3,9,11,13,15-17] Serial bougienage or balloon dilatations are equally effective.[2,11,13,15,16] Intralesional steroid injections in conjunction with dilatation and incisional therapy or stricturoplasty are additional options employed on an individualised basis in patients with recalcitrant strictures.[1] The temporary placement of

fully covered self-expanding metal stents (SEMS) may occasionally be required.[1,2,15]

There remains a paucity of international data on benign oesophageal strictures in general and their risk factors for recalcitrance with a complete absence of data in the South African context. This study aims to audit local peptic oesophageal strictures and attempts to identify factors associated with stricture recalcitrance. Early identification will facilitate counselling these patients regarding likelihood of prolonged invasive treatment modalities. In addition, this data will assist the unit with financial planning as treatment duration of the recalcitrant strictures is longer and has financial implications that need to be factored in during budget allocation.

Methods

Patient population

This is a single-centre retrospective study of all adult patients (> 18 years) with peptic strictures presenting to the Upper Gastrointestinal Surgery Unit at Groote Schuur Hospital between 1 March 2018 and 1 March 2022 (study approved by the University of Cape Town Human Research Ethics Committee, REF251/2021). Patients eligible for inclusion into the study were identified from a prospectively maintained registry of all endoscopy procedures performed by the Upper Gastrointestinal Surgery service at Groote Schuur Hospital (registry approved by the University of Cape Town Human Research Ethics Committee, REF 031/2015). All adult patients presenting to the unit with dysphagia due to benign PS were included in the study. Patients younger than 18 years or those with malignant and benign oesophageal strictures other than PS were excluded. Patients with missing data, including demographics, stricture aetiology or management were excluded. The unit routinely takes biopsies of all oesophageal strictures and all patients included had histological confirmation excluding malignancy. Once stricture recalcitrancy was confirmed, repeat biopsies were routinely taken to exclude missed pathology.

Definitions

A recalcitrant stricture was defined as either refractory or recurrent. Refractory strictures fail to achieve an oesophageal diameter of more than 14 mm after 5 sessions of endoscopic dilatations with 2-week intervals.[2,5-8] A recurrent stricture is where there is an inability to maintain an oesophageal luminal diameter of more than 14 mm for more than 4 weeks after achieving an initial diameter of 14 mm.[2,8] Dysphagia was graded using a system previously described by Earlam et al.[18] (grade 0: normal swallowing, grade 1 occasional difficulty to swallow solid food, grade 2 occasional difficulty swallowing minced solids, grade 3: unable to swallow minced foods, grade 4: unable to swallow pureed or liquidised foods and grade 5: unable to swallow liquids or saliva). Although not well defined in the literature, we further defined significant dysphagia as equal to or more than grade 4 dysphagia, as most patients struggle to maintain adequate nutrition while

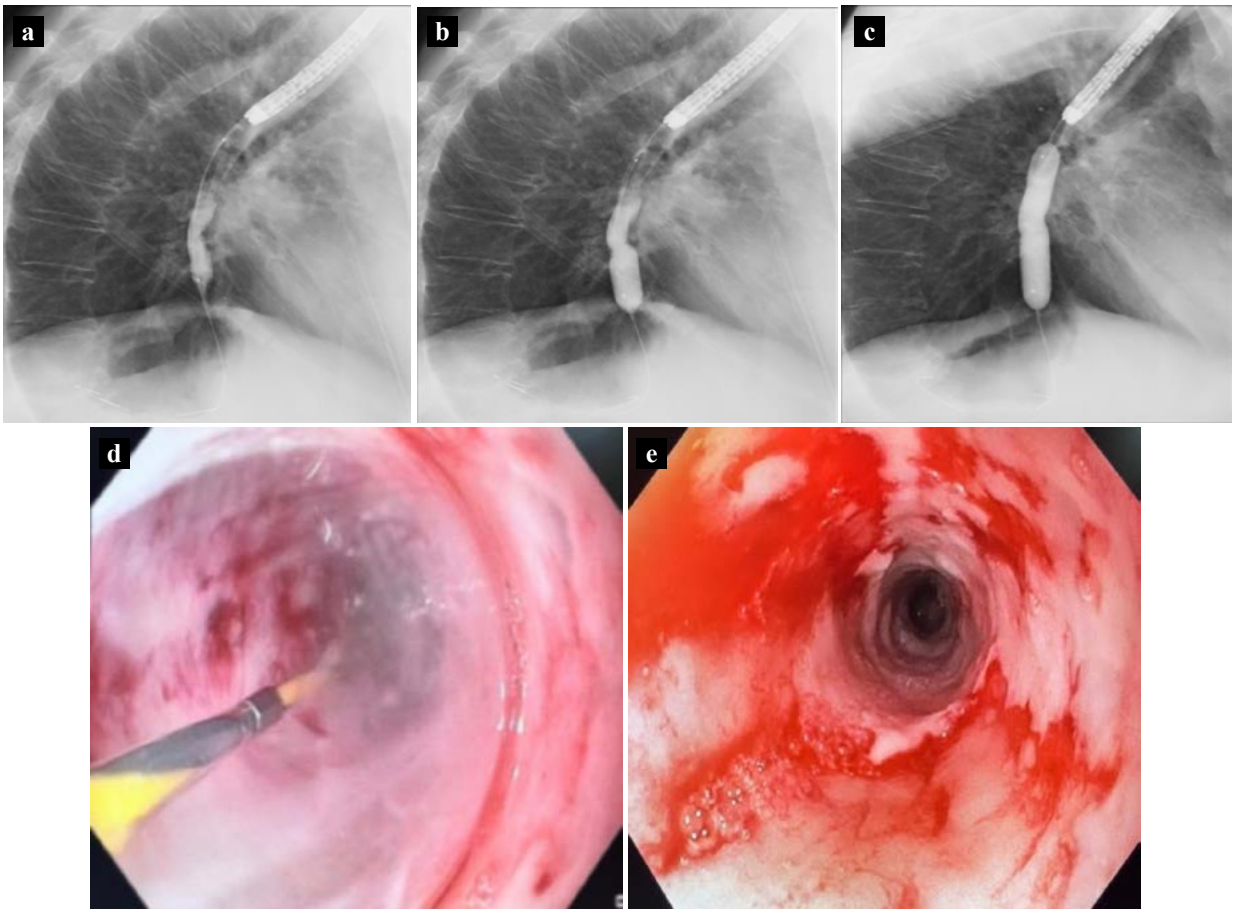

Figure 1: a. Beginning of dilatation with stricture positioned mid balloon; b. Balloon partially inflated; c. Balloon fully inflated; d. Endoscopic view of distal benign peptic stricture pneumatic balloon dilatation; e. Endoscopic view post-balloon dilatation

only tolerating fluids. The first bougie dilator that was used to dilate the stricture was used as the index diameter of the stricture. In patients where a bougie dilator was not used at the initial endoscopy, an estimate of the luminal diameter was made by the endoscopist prior to intervention. Although index diameter severity has not been previously categorised, the authors decided on defining the index diameter as being mild, moderate, severe or extremely severe (mild: more than 11 mm; moderate: 9–11 mm; severe: 6–8 mm; extremely severe: less than 6 mm) – these ranges were decided upon by the authors of this study and have not been used previously. The oesophagus was divided into proximal, mid and distal oesophagus (proximal: less than 20 cm from incisors; mid: 20–30 cm from incisors, and distal: more than 30 cm from incisors).

Endoscopic dilatation technique

With patients in the left lateral position, an endoscopic dilatation is performed using a standard gastroscope. This is performed simultaneously with fluoroscopy and pharyngeal xylocaine spray plus intravenous conscious sedation with individualised combinations of midazolam, fentanyl or propofol. Nasal prong oxygen and non-invasive blood pressure, pulse and oxygen saturation monitoring are standard. Endoscopic balloon dilatation (EBD), bougienage, incisional therapy, intralesional steroid injection and temporary stenting are available as dilatation treatment modalities in our unit. The choice of which therapy is used is left up to the discretion of the endoscopist. For PS management, EBD and serial bougienage are the most frequently employed options. The gastroscope is first passed to confirm the presence of the stricture, determine stricture position and if traversable, and to confirm presence or absence of a hiatus hernia. If the gastroscope passes the stricture before any dilatation, the residual index diameter of the stricture is presumed to be ≥ 11 mm. The starting size and type of dilator utilised is at the discretion of the attending endoscopist.

Bougienage is performed over a standard hydrophilic soft-tipped 0.035" guidewire with serial Savary Gillard dilators and gradual incremental size increases (at the endoscopists discretion), with each dilatation performed under fluoroscopic guidance. EBD is performed using over-the-wire, through the-scope (TTS) balloons with a mixture of 50% water to 50% radio-opaque contrast for balloon insufflation using a hydrostatic device with pressures according to manufacturer specifications correlating to specific diameters. TTS balloons are insufflated during continuous fluoroscopy, ideally with the stricture "waist" positioned mid-balloon. Duration of insufflation is 120 seconds. Figure 1 demonstrates EBD under fluoroscopic guidance and endoscopic view of the stricture dilatation. Bougienage is favoured where possible due to cost. On completion of any dilatation, a review of the dilated area is routinely performed by repeat gastroscopy. If any concern for a full-thickness tear exists, contrast is injected into the oesophageal lumen under fluoroscopy to evaluate for any extravasation.

Temporary fully covered self-expanding metal stents (SEMS) are occasionally placed in specific circumstances for PS, either as an immediate management of iatrogenic stricture perforations or when the performance status or nutritional state of the patient precludes safe dilatation. These stents are then removed within 4–6 weeks with the patient subsequently joining a scheduled dilatation programme. Dilatation intervals are usually between 2–4 weeks, with shorter intervals scheduled for severe or extremely severely narrow strictures. Restrictions as regards transport availability from rural areas are factored in. All patients diagnosed with PS are routinely placed on chronic twice daily PPI and asked to modify their risk behaviours. Patients are followed-up until complete stricture resolution with no dysphagia or are lost to follow-up.

Assessment of outcomes

The following data categories were collected: patient demographics, comorbidities, chronic medication, patient reported smoking and substance use, GORD symptoms, prior or present H2 receptor antagonist or PPI use and the degree of dysphagia on initial presentation. Endoscopy findings were recorded with emphasis on position of stricture, residual lumen, dilatation technique employed, maximum dilatation size achieved, immediate technical success or any procedural complications (as per the Clavien-Dindo classification).[19] Subsequent dilatation frequency and interval duration were noted until clinical resolution of dysphagia, achievement of endoscopic success or until the end of the study period.

Statistical analysis

Data analysis was done using Microsoft Excel and IBM SPSS Statistics (version 29.0.0.0). Patient demographics, PS details and management were described using simple descriptive statistics, with mean +/- standard deviation for parametric data and median with interquartile range for non-parametric data. Univariate analyses were performed to assess for any factors associated with stricture recalcitrance using chi-square test for univariate categorical data and Kruskal-Wallis test to allow for comparison of multiple groups with non-parametric data. Single factors (not multiple groups) found to be significant were further analysed using odd's ratio. A p-value of < 0.05 was considered statistically significant. The factors that were evaluated for association with recalcitrance included the patients age, gender, comorbidities, including medication use (specifically ARV use) recreational substance use, initial degree of dysphagia, stricture position, presence of a hiatus hernia, number of dilatations and index stricture diameter.

Results

A total of 69 patients (32 female; 37 male) with peptic strictures met the inclusion criteria. The median age was 56 years. Recalcitrant strictures were diagnosed in 27 (39.1%) while 42 (60.9%) patients had non-recalcitrant strictures. Common comorbidities included hypertension, type II diabetes mellitus, dyslipidaemia, chronic obstructive airway disease and human immunodeficiency virus (HIV) infection. Seven patients (25.9%) with recalcitrant strictures were on antiretroviral (ARV) therapy. Smoking was the most common recreational substance used, followed by alcohol. In the recalcitrant group of patients, 48% (n = 13) presented with significant dysphagia at their primary endoscopic dilatation, while in the non-recalcitrant group only 23.8% (n = 10) had significant dysphagia.

The majority (n = 53; 76.8%) presented with distal oesophageal strictures; 14 had mid-oesophageal strictures and two patients had proximal strictures. A hiatus hernia

Table I: Association between potential risk factors and recalcitrant peptic strictures

			Not recalcitrant		Recalcitrant		*p*-value	Odd's ratio
Age – median (IQR) years			62.5 (48.5–70.8)		51.0 (38.5–61.0)		**0.044***	
		Total	***n***	**%**	***n***	**%**		
Gender	Female	32	21	65.6	11	34.4	0.455	
	Male	37	21	56.8	16	43.2		
Comorbidities	None	22	12	54.5	10	45.5	0.465	
	Yes	47	30	63.8	17	36.2		
Hypertension	No	50	27	54.0	23	46.0	0.06	
	Yes	19	15	78.9	4	21.1		
Diabetes	No	63	38	60.3	25	39.7	0.762	
	Yes	6	4	66.7	2	33.3		
Hypercholesterolemia	No	65	40	61.5	25	38.5	0.649	
	Yes	4	2	50.0	2	50.0		
COAD	No	65	40	61.5	25	38.5	0.649	
	Yes	4	2	50.0	2	50.0		
HIV	No	57	37	64.9	20	35.1	0.137	
	Yes	12	5	41.7	7	58.3		
ARVs	No	59	39	66.1	20	33.9	**0.032***	**4.55 (95% CI 1.06–19.51)¶**
	Yes	10	3	30.0	7	70.0		
Substances	No	52	32	61.5	20	38.5	0.843	
	Yes	17	10	58.8	7	41.2		
Smoking	No	55	34	61.8	21	38.2	0.751	
	Yes	14	8	57.1	6	42.9		
Recreational drug use	No	68	41	60.3	27	39.7	0.423	
	Yes	1	1	100.0	0	0.0		
Alcohol	No	65	40	61.5	25	38.5	0.649	
	Yes	4	2	50.0	2	50.0		
Initial dysphagia degree	Grade 0–2	26	24	92.3	2	7.7	**< 0.001***	**16 (95% CI 3.34–76.65)¶**
	Grade 3–4	42	18	42.9	24	57.1		
Stricture position	Proximal < 20cm	2	1	50.0	1	50.0	0.497	
	Mid 20–30 cm	14	10	71.4	4	28.6		
	Distal >30cm	53	31	58.5	22	41.5		
Hiatus hernia	No	14	10	71.4	4	28.6	0.354	
	Yes	52	30	57.7	22	42.3		
Dilatations *n*	0 Dilatations	25	23	92.0	2	8.0	**< 0.001***	
	1–2 Dilatations	20	15	75.0	5	25.0		
	3–5 Dilatations	12	4	33.3	8	66.7		
	> 5 Dilatations	12	0	0.0	12	100.0		
Index stricture diameter	< 6 mm	3	1	33.3	2	66.7	**< 0.001***	
	6–8 mm	21	8	38.1	13	61.9		
	9–11 mm	13	6	46.2	7	53.8		
	>1 1mm	32	27	84.4	5	15.6		

IQR – interquartile range, HIV – human immunodeficiency virus, COAD – chronic obstructive airway disease, LDL – lower than detectable limit, ARVs – antiretrovirals; *p-value < 0.05, ¶ Odds ratio > 1.0

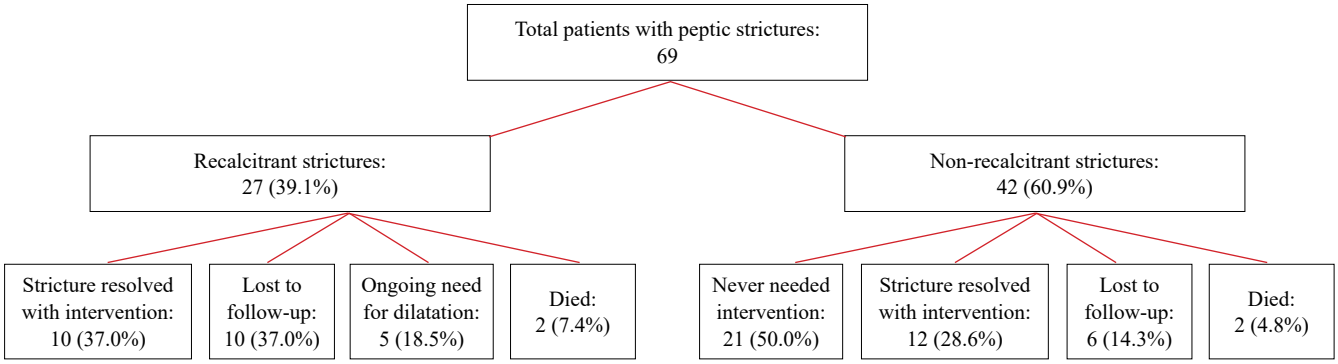

Figure 2: Flow diagram of patient outcomes

Table II: Complications post-endoscopic intervention

Type of stricture	Presence of complications		Clavien-Dindo classification [1]	
	Yes	No	Grading	Complications *n*
Recalcitrant	11	16	I	5
			II	1
			III(a)	3
			III(b)	0
			IV(a)	0
			IV	0
			V	2
Non-recalcitrant	2	40	I	0
			II	0
			III(a)	2
			III(b)	0
			IV(a)	0
			IV(b)	0
			V	0

[1]Classification of surgical complications according to Dindo et al.[19]

was diagnosed endoscopically in 52 patients (75.4%). In 22 patients, while the PS was noted, the residual oesophageal lumen was wide enough to easily allow scope passage and as such no dilatation was required. The remaining 47 all required one or more dilatations (Table I), with patients requiring more than 3 dilatations later all meeting the definition for recalcitrancy (either refractory or recurrent). A total of 265 dilatations were performed in this cohort. Forty patients had only bougie dilatations, 4 patients had both EBD and bougie dilatation. None of the patients were managed with EBD only. Although available in the unit, none of the patients included in this study were managed with either incisional therapy or intralesional steroid injections.

Fourteen patients required temporary oesophageal stenting prior to entering the dilatation programme. The decision for temporary stenting with a fully covered SEMS was made if the patient was subjectively deemed to be very frail, severely malnourished or had a pin-point residual oesophageal diameter considered by the endoscopist to be high risk for perforation during dilatation. In total 24 temporary stents were placed in these 14 patients with some patients having multiple stents replaced over time. The majority (n = 11, 79%) of stented patients were from the recalcitrant stricture group. Two patients (14%) were managed by stenting only. Eight patients continued with the dilatation programme after stent removal; four patients were lost to follow-up after primary stent placement. Two (14%) patients were dilated with both bougie and EBD following final stent removal, while the remainder by only bougie dilatation (n = 10;71%). Six (42%) strictures initially stented subsequently resolved during the study period, while a further 2 (14%) patients were lost to follow-up after having progressed to endoscopic dilatations. Two stented (14%) patients died during the study period (one of severe malnutrition, the second patient of metastatic cervical cancer).

Table I shows the associations between potential risk factors and recalcitrant peptic strictures. Risk factors for recalcitrant peptic strictures included age (median age 62 vs 51, p = 0,04), initial degree of dysphagia (n = 24 vs 18, OR 16 [95% CI 3.34–76.65], p-value < 0.001), number of dilatations (p = 0.001), index stricture diameter and ARV usage (p = 0.032; OR 4.55 [95% CI 1.06–19.51]). The patients who had these potential risk factors were likely to receive aggressive treatment strategies over a prolonged period of time, compared to those who did not have these potential risk factors. HIV status and smoking were not associated with recalcitrant strictures. Gender, comorbidities, presence of a hiatus hernia and stricture position were also not associated with recalcitrant peptic strictures. Outcomes of the 69 patients are presented in Figure 2.

Table II demonstrates endoscopic intervention-related complications during the study period. A total of 13 patients had complications. There were four immediate complications that occurred during endoscopy, two partial-thickness tears managed endoscopically, a gastric perforation requiring an over the scope-clip closure of a small gastric defect and one sedation-related hypoxia necessitating a short period of bag-mask-valve ventilation and sedation-reversal. Two procedure-related deaths occurred in the dilatation cohort: one from a suspected aspiration pneumonia five days after last dilatation and one death from a suspected missed oesophageal perforation. This equates to a 2.3% immediate endoscopic intervention complication rate for 265 interventions performed for this cohort. Eleven delayed stent-related complications occurred: nine early stent migrations and two failed removals of stents due to mucosal ingrowth after delayed patient return.

Discussion

This study showed a higher recalcitrancy PS rate of 39%, compared to the approximate 10% shown in the international literature.[8-10] The reasons for this are likely multi-factorial but may be difficult to identify from this dataset. Previously identified risk factors for refractory or recurrent strictures are numerous with narrow index diameter, higher dysphagia grade and number of oesophageal dilatations shown to be associated in our study, which correlates with prior studies.[2,9,11,12] In addition, a younger age was also associated with recalcitrancy in this study.

While 68% of the cohort were taking chronic medications for various comorbidities, the use of ARV medication, and not being HIV positive in itself demonstrated an association with recalcitrant strictures. This is a novel finding and the underlying aetiology or association is not clear. We postulate that the ARVs perhaps cause a pill oesophagitis. The exact ARV drugs taken by the patients could not be ascertained in the dataset and certain of the ARVs may have a higher association with recalcitrancy than others, but this could not be elucidated from this data. The most common mechanism of pill induced oesophageal mucosal injury is due to local acid or hyperosmolar mucosal burn resulting from pills being retained in the oesophagus.[20] Medication that has previously been described to cause pill oesophagitis by this mechanism, includes ascorbic acid, ferrous sulphate, potassium containing tablets and antibiotics such as doxycycline, tetracyclines and clindamycin. Nonsteroidal anti-inflammatory drugs, aspirin, bisphosphonates and chemotherapy agents such as paclitaxel have also been described to cause local mucosal burn.[20] Patients with PSs are always encouraged to crush their tablets and advised to ingest the crushed tablet with copious amounts of fluid to help prevent pill oesophagitis.

The corner stone in management of PSs remains usage of PPIs and endoscopic dilatation with either a bougie dilatator or EBD, with no differences in safety and efficacy between the 2 types of dilation techniques.[1-3,9,11,13,15-17,21,22] Previous literature has demonstrated an 80–90% clinical success rate amongst patients who are managed with these modalities. Our local success rates for the endoscopic treatment of PS are considerably lower at 60.8%. The minority of patients that remain symptomatic despite these treatment modalities require prolonged periods of dilatation due to chronic inflammation and fibrosis that cannot be easily mediated with expansile, transient radial and longitudinal forces applied during dilatation.[10] These patients require early identification and risk stratification, with counselling regarding possible treatment duration and potential intervention complications.

Endoscopic dilatation with intralesional steroid injection using triamcinolone acetate is an alternative combination therapy for recalcitrant benign PSs.[21,22] It is thought to inhibit inflammatory response, reducing collagen synthesis, fibrosis and chronic scarring.[22] Steroid injection has been shown to reduce the number of required dilatations and increase the dysphagia free period.[22] Triamcinolone acetate is unfortunately not available in South African state practice and our unit has had little success with alternative forms of available injectable steroids. Mitomycin C is an antineoplastic agent that has been used as an alternative or to supplement intralesional steroid injections, with positive outcomes reported predominantly in paediatric benign oesophageal strictures, but no definitive evidence presently exists for the use of Mitomycin C in adult patients. [21,22]

Incisional therapy is a further alternative treatment option recommended for short, simple strictures.[21,22] A maximum of 3 sessions of incisional therapy are recommended, after which alternatives should be considered if strictures persist.[22] Short, fibrotic strictures as often seen with anastomotic strictures, lend themselves well to incisional therapy. However, in our prior experience the active inflammation usually present in PSs, does not readily avail itself to incisional therapy. While daily self-dilatation is reported as a successful alternative in refractory strictures, our institution only has one full set of bougie dilators and thus cannot accommodate sending patients home with these.[23] For these reasons, none of the above adjunctive therapies were used in this cohort.

Oesophageal stenting is a safe alternative modality for the management of benign PSs, usually recommended towards the end of the algorithm for the treatment of persistent strictures. Using SEMS is thought to increase the overall dilatation period of the stricture when compared to other dilatation alternatives; there is, however, no data to support this.[21,22] SEMS are thought to reduce the rate of restricturing, by remodelling of the stricture while the stent is in place maintaining luminal patency.[22] The stent is kept in place for 6–8 weeks but should not exceed 12 weeks to reduce the risk of mucosal ingrowth related to a hyperplastic tissue reaction.[22] In our unit, oesophageal stenting was used as an alternative or in conjunction with bougie and sometimes balloon dilatation. When the index diameter of the stricture was deemed too narrow to allow for safe dilatation in a patient severely malnourished or frail (decided by the treating endoscopist), primary stenting was offered to avoid potential complications of stricture dilatation by bougie or EBD. Stenting was also offered as treatment progression following failed endoscopic dilatation in recalcitrant strictures. There was a 42% stricture resolution rate amongst the patients who were managed with oesophageal stents in this study thus making stenting a safe alternative bridging tool when other modalities of dilatation are not safe to perform. The literature demonstrates 35–45% clinical resolution rate amongst stented patients.[22] Evidence shows that use of stenting reduces the number of dilatations and increases the dysphagia free periods.[22] Care must be taken, though, when stenting distal benign strictures, as these tend to migrate in our experience and are often associated with worsening volume reflux when crossing the lower oesophageal sphincter.

The strength of this study is that there is no local data published previously regarding factors associated with recalcitrant PSs or the management thereof. Limitations are the retrospective nature of the study; it is a single institution review and that local restrictions have forced deviations from internationally recommended treatment algorithms for recalcitrant benign strictures. Furthermore, the study participant numbers are limited, making statistical inferences difficult. The retrospective nature of the data makes it difficult to understand why the recalcitrancy rate is so high. The data is captured in a prospectively-maintained endoscopy registry, but is unable to assess for ongoing risk factors, such as cigarette smoking or compliance (or lack thereof) to PPI therapy. Another major limitation is that the study offers no data on nutritional status in these patients, which anecdotally often seems very poor in these patients, but not objectively well assessed. This might be an important factor in explaining the high rate of recalcitrant strictures in this setting, and could be the focus of future research in benign oesophageal strictures. Future research could also investigate the role of surveillance upper gastrointestinal endoscopies in patients who have a combination of GORD and these risk factors and, if further studies show a similar

association between ARV use and stricture recalcitrancy, investigating specific ARV regimens might prove useful.

Conclusion

In conclusion, recalcitrant PSs continue to be an ongoing cause of morbidity locally with lower treatment success rates despite availability of most internationally recommended endoscopic treatment modalities. Younger age, presenting degree of dysphagia, requiring more than 3 dilatations, smaller index stricture diameter and use of ARVs were all significantly associated with stricture recalcitrancy. Identifying at-risk patients early will allow management modification to improve outcomes, which may include increased patient counselling on the need for prolonged treatment and realistic outcome expectations. With improved psychological preparation and patient insight, treatment adherence and follow-up may improve. In addition, this data will assist the unit with financial planning as treatment duration of the recalcitrant strictures is longer and may occasionally be associated with complications, thus these financial implications would have to be factored in during budget allocation.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

This study was approved by the University of Cape Town Human Research Ethics Committee (HREC 251/2021).

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