Laparoscopy for perforated duodenal ulcer: A morbidity score based on a cohort study of 384 patients

Chirurgie laparoscopique pour ulcère duodénal perforé: Score prédictif de morbidité post-opératoire.

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RÉSUMÉ

Introduction : Le traitement laparoscopique de l'ulcère perforé s'accompagne d'une morbimortalité moindre en comparaison avec le traitement par laparotomie. Le traitement chirurgical classique vise la complication (perforation) et la maladie ulcéreuse en un même temps. Cependant, la morbidité de la voie laparoscopique est non nulle (4%). Elle est influencée par des facteurs prédictifs pré et per opératoires. Le but de notre travail est d'établir un score de morbidité chez les patients opérés par voie laparoscopique pour péritonite aigue par ulcère duodénal perforé.

Méthodes : Il s'agit d'une étude rétrospective descriptive et analytique réalisée dans le service de chirurgie générale d'un CHU de Tunis. Nous avons inclus 384 cas d'ulcère duodénal perforé opérés par laparoscopie sur une période de quatorze ans s'étalant de janvier 2000 à décembre 2014. En étude univariée, la recherche des facteurs de risque a été effectuée en calculant l'Odds ratio pour identifier les facteurs de morbidité indépendants. Nous avons conduit une analyse multivariée en régression logistique par méthode pas à pas descendante. A partir de ces facteurs indépendants nous avons établi un score en utilisant les courbes de ROC. Le seuil ayant la meilleure spécificité et sensibilité pour prédire la morbidité a été recherché. Dans tous les tests statistiques, le seuil de signification a été fixé à 0,05.

Résultats : Le taux de morbidité globale de nos patients était de 3.3 % (13 patients).L'analysemulti variée a permis de relever Cinq facteurs de risque indépendants de morbidité : La température supérieure à 37.6° c, une insuffisance rénale, un âge >45 ans un nombre des points de suture supérieure à 2 et temps opératoire supérieure à 75 minutes. Notre score de morbidité a pris en comptes ces 5 facteurs en intégrant la valeur propre de chaque facteur. Le seuil du score ayant le meilleure couple sensibilité spécificité pour prédire la morbidité était égal à 10.

Conclusion : Un score de morbidité par ulcère duodénal perforé opéré par voie laparoscopique pourrait être utile pour organiser la prise en charge post opératoire de ces malades en général jeunes et actifs. Un score inférieur au seuil prédictif de morbidité pourrait permettre une réhabilitation rapide voire une gestion en ambulatoire de ces patients. Un score élevé serait une indication au drainage abdominal et à la prolongation de l'hospitalisation. Une étude prospective utilisant ce score est actuellement en cours dans notre service.

Mots-clés

Score- Ulcère duodénal perforé-Traitement- Laparoscopie- Perforation- Péritonite - Morbidité – Mortalité.

SUMMARY

Background: The Laparoscopic treatment of perforated ulcer is accompanied by a lesser morbidity and mortality compared with treatment by laparotomy. However, the morbidity of the laparoscopic approach is not nil (4%). It is influenced by pre and intraoperative factors.

The aim of our work is to establish a morbidity score in patients undergoing laparoscopic surgery for acute peritonitis with perforated duodenal ulcer.

Methods: This is a retrospective study conducted in a General Surgery Department. We included 384 cases of perforated duodenal ulcer operated laparoscopically over a fourteen-year period ranging from January 2000 to December 2014.

We conducted a multivariate logistical regression analysis by step-by-step-descending method. From these independent factors we established a score using the ROC curves. The threshold with the best sensitivity and specificity for predicting morbidity was investigated. In all statistical tests, the significance level was set at 0.05.

Results: The overall morbidity rate of our patients was 3.38% (13 patients). Multivariate analysis has identified five independent morbidity risk factors: temperature higher than 37.6° C, renal failure, age> 45 years, a number of stitches of two or higher and operating time to 75 minutes or longer. Our morbidity score took into account these 5 factors by integrating the intrinsic value of each factor. The threshold of the score having the best torque sensitivity specificity to predict morbidity was 10.

Conclusion: A morbidity score for perforated duodenal ulcer surgery performed by laparoscopy may be useful to organize the post-operative care of these patients usually young and active. A lower score than the threshold predictive of morbidity could allow a rapid rehabilitation of these patients and a one day hospitalization management.

Key-words

Ulcer-peritonitis-perforated-morbidiy-score-duodenum

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Intra-peritoneal perforation remains the most common complication of duodenal ulcer in many countries. Laparoscopy has simplified the management of this complication [1]. The morbidity decreased markedly with only the treatment of the complication without surgical treatment of the ulcer [2]. However, the morbidity remains redoubtable. Different predictors of this morbidity exist in the literature. Their interest in the post-operative management of patients is undeniable.

The aim of our study is to establish a new morbidity score for patients laparoscopically operated on for acute peritonitis by perforated duodenal ulcer.

METHODS

This is a retrospective study of all patients laparoscopically operated on with the perforated ulcer diagnosis made on clinical examination and / or after radiological investigations. The study period spans 14 years (2000-2014). We did not include in our study the patients operated initially by laparotomy and the patients treated by non operative method. Data collection concerned with pre, intra and postoperative data. The primary outcome measure was postoperative morbidity. It was defined as a complication (specific or non-specific) occurring within 30 days of the operation or during the same hospitalization regardless of its duration.

Comparisons of two means on independent series were made using Student's t-test for independent series. Comparisons of several (> 2) means on independent series were performed using the Snedecor F-Analysis of variance (ANOVA).Comparisons of percentages on independent series were made by the Pearson's chi-square test. In case of non-validity of this test, exact bilateral test of Fisher was used. In order to identify the risk factors independently related to the event, we conducted a logistical regression step-by-step descending method.

For the calculation of the overall morbidity score, we assigned each of the factors that appeared to be independently related to the overall morbidity, a number of points equal to its adjusted odds ratio and divided by 6 (to have manageable numbers), if present, and equal to 1 by definition if it is absent. In all statistical tests, the significance level was set at 0.05.

The threshold value for post-operative morbidity was established by ROC curves (Receiver Operating Characteristics) to find the value of the variable corresponding to the best couple «sensitivity-specificity», after checking that the area under the curve was significantly > 0.500.

RESULTS

Population study:

We included 384 patients in our study. The average age of our population was 38 years, with extremes of 16 and 86 years. The sex ratio was 28.5. Nineteen patients (4.9%) had previous abdominal surgery. Smoking was reported in 346 cases (90.1%) with a median consumption of 20 pack-years. Alcohol consumption was observed in 214 cases (55.7%). Our patients were classified ASA I in 369 cases (96%), ASA II in 11 cases (2.8%) and ASA III in 4 cases (1%). The clinical and biological data are summarized in Table I.

Table I: clinical and biological data

	Number of cases	Percentage (%)
Abdominal pain		100
Epigastric	303	78,9
Right hypochondrium	15	3,9
Left hypochondrium	3	0,78
Generalized	63	16,4
Temperature ≥38,5°C	24	6,25
Vomit	224	58,3
Transit disorders	15	3,9
Gravity signs	6	2
Abdominal examination		
sensibility	5	1,3
guarding	81	21
Contracture	269	70
WBC ≥10,000	291	75,7
Urea		
≥ 6-10mmol/ l	106	27,6
> 10 mmol/l	18	4,6

X-ray centered on the diaphragmatic cupolas was performed in 380 patients (98.9%). It had shown pneumoperitoneum in 268 cases (70.52%). Abdominal CT was performed in 15 cases (3.9%). It showed pneumoperitoneum in 15 cases (3.9%), intraperitoneal fluid effusion in 11 cases (2.8%) and densification of the sub-peritoneal fat in 1 case.

The data of the surgical exploration are summarized in Table II. For the ulcer's laparoscopic suture, Two stitches were performed in 53 patients (13.8%). More than two stitches were used to close the ulcer in 26 cases (6.7%). A leak test was performed in 326 patients (84.8%). This test was positive in 47 cases (12.2%). It imposed the strengthening of the suture by other stitches in all these cases. Drainage of the peritoneal cavity was performed in all cases. The drainage was active in 353 cases (92%) and passive in 31 cases (8%). The median duration of the intervention was 65 minutes (35-150 minutes).

Conversion to laparotomy was performed in 33 cases (8.5%). It was motivated by a difficulty in suturing the ulcer in 23 cases, a difficulty in the peritoneal washing in 4 cases, an associated stenosis of the duodenum discovered intra-operatively in two cases, a suspicious pre-pyloric ulcer in one case, an ulcer larger than 30 mm in two cases and the discovery of associated liver hydatid cyst in one case.

Table 2: Intraoperative data

	Number of cases	Percentage (%)
Peritonitis diffusion	54	14,1
localized	330	85,9
generalized		
false membranes		67,2
Yes	258	22,8
No	66	
Perforation location		78,7
Anterior surface	302	11,8
Upper edge	45	9,4
Prepyloric	35	
Perforation size		65,6
>5 mm	252	34,4
<5mm	132	
duodenal stenosis		97,9
No	376	2,1
Yes	8	

Morbidity and mortality:

The postoperative course was uneventful in 95.3% (369 patients). The mean hospital stay was 4 days, with extremes of 2 to 28 days.

The overall mortality was 0.5% (two patients). The cause of death was postoperative peritonitis by dismissed iatrogenic perforation of the small intestine in one case and pulmonary embolism in one case.

The overall morbidity rate was 3,38 % (13 patients). Three patients had medical complications (0.78%). Respiratory infection was present in 2 cases and lower limb thrombophlebitis was present in 1 case. The outcome was favorable under medical treatment in all cases. Ten patients had a duodenal fistula. In seven cases, duodenal fistulas were well directed and required drainage prolongation from 13 to 21 days. Three patients had postoperative peritonitis. Two patients were re-operated by laparoscopy with lavage and suture of the perforation. One patient was re-operated by median laparotomy with ulcer suture, bivagotomy and pyloroplasty.

Predictive morbidity score

In the univariate analysis, preoperative factors significantly influencing postoperative morbidity were: Age> 45 years (p = 0.0001), Smoking (0.001), Functional renal failure with elevated blood urea> 6.5 mmol / l (p = 0.003) and thrombocytopenia (p = 0.002). Temperature> 37.6 ° (p = 0.062) and Septic shock (p = 0.069) were at the limit of significativity factors. These two factors have been forced in the multivariate analysis. The need for more than two stitches and duration of surgery > 75 minutes were related to morbidity with p = 0.029 and p = 0.0001, respectively. Conversion to laparotomy had not been significantly predictive of morbidity.Analysis of postoperative monitoring elements has allowed to individualize prolonged gastric aspiration and delayed oral feeding as factors influencing postoperative morbidity (p = 0.0001).

The factors independently related to morbidity were age> 45 years, temperature> 37.6 ° c, renal failure with elevated blood urea> 6.5 mmol / l, use of more than two stitches for ulcer closure and duration of surgery > 75 minutes.

The morbidity score considered these 5 independent risk factors. A number of points, integrating the eigenvalue of each factor, has been assigned in the presence of this factor. The score is represented by the sum of the points assigned to each factor. The score varied from 5 to 21. The threshold value for post-operative morbidity was 10 points. The negative predictive value of this threshold is 100% with a specificity of 83.8%. No cases of morbidity were reported for a score <10. The sensitivity of this threshold is 100% (Figure 1).

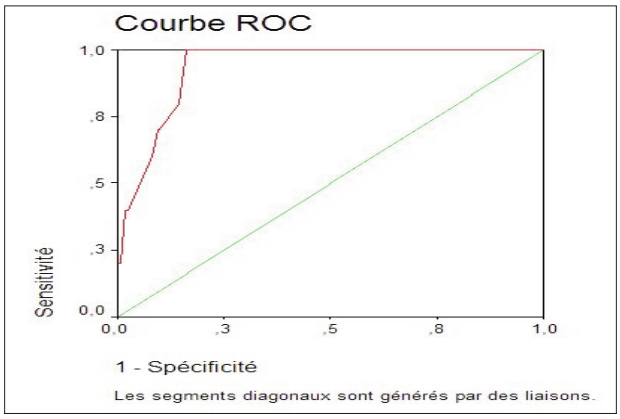

Figure 1: ROC curve of the threshold of the scoring system to predict morbidity

DISCUSSION

We have established a postoperative morbidity score of 5 easily collected items from a series of 384 patients. This score takes into consideration 5 variables: age, functional renal failure (urea ≥ 6.5 mmol / l), temperature ≥ 37.6 ° C, the need of more than 2 stitches in laparoscopy and the operative duration ≥75 min.

As a morbidity score, it takes into consideration operative data i.e. the need for more than two stitches and operative duration. Although retrospective, our study included a large number of young patients. The attitude towards this frequent complication was codified in our department, limiting the bias associated with data collection. This score allows us to identify the serious patients to be hospitalized in Intensive Care with close monitoring. In these patients, the interest of abdominal drainage, to limit duodenal fistulas consequences, may be considered. On the other hand, in patients with a score lower than 10, one day care could be proposed. Abdominal drainage is no longer necessary. The strength of this score lies in the negative predictive value and the sensitivity of 100% to classify patients.

The interest of laparoscopy to reduce morbidity and mortality compared to laparotomy is no longer needed to be demonstrated [2]. Several publications have addressed predictive factors of mortality or morbidity in laparoscopy for perforated duodenal ulcer. Age is a risk factor often found [3]. Comorbidities represent the second predictive factor of mortality, sometimes giving priority to the use of general scores [4, 5]. The diameter of the duodenal perforation has been the subject of some scientific questions [6]. In our study, this factor did not emerge in multivariate analysis.

These predictive factors were integrated into different scores assessing mortality or morbidity after laparoscopy for duodenal ulcer. Non-specific scores such as APACHE, POSSUM, ASA or the Charlson index have been tested and validated as predictive of mortality [6]. The only non-specific score that would give an objective idea of morbidity was Charlson's index [7]. Apart from the ASA score, the various non-specific scores are complex to calculate. They limit themselves to predicting the mortality which has markedly decreased with laparoscopy. The ASA score is a general score that seems insufficient for this population generally young and not tarred.

Some specific scores for the perforated duodenal ulcer were validated. It is mainly the score of BOEY[7], the Hacettepe score [8], the Jabalpur score [9] or the most recent PULP score[10].The BOEY score takes into account preoperative characteristics. It was established on a heterogeneous population operated for radically perforated ulcer, by laparoscopy, laparotomy or having benefited from Taylorization. The mean age in this series was 51 years [6]. The different series of morbidity and mortality show that there is a significant difference in mortality related to age [11, 12]. In our study the average age was 36 years. BOEY scores, like non-specific scores, would not seem very suitable for the young population. It would also make it possible to predict mortality well but would appear to be unsuitable for morbidity [5].

The Jalabapur score is more appropriate for a young population than the Hacetepe score. These scores were validated in cohorts in India and Turkey [9, 10].

PULP score is the most recent score. It is based on a large study including 2,668 patients [10]. This score integrates patient comorbidities; ASA score and BOEY score parameters [10]. It predicts morbidity with an area under the ROC curve that is important [6]. However, this score was not validated on a population other than that of the main study.

Our score is dedicated to morbidity and concerns only patients operated laparoscopically. It has been validated on a young and mainly undefined population. Among the patients included, some patients had a conversion to laparotomy. This factor could have biased the study. However, conversion to laparotomy did not significantly affect morbidity. The area under the ROC curve is large with a sensitivity of 100% and a negative predictive value of 100%.

CONCLUSION

This morbidity score, for perforated duodenal ulcer operated by laparoscopy, is validated on a young population, mostly not tarred. Its sensitivity is 100% as well as its negative predictive value. It would benefit from being validated on other populations and could also make it possible to include selected patients in one day hospitalization protocol.

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