STROBE Statement—checklist of items that should be included in reports of observational studies

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|  | **Item**  **No** | **Recommendation** |
| **Title and abstract** | 1 | (a) The effect of the Borrmann type combined with vessel invasion status on the prognosis of advanced gastric cancer |
|  |  | (b) To evaluate the significance of the Borrmann type combined with vessel invasion status on the prognosis of advanced gastric cancer. |
| **Introduction** |  |  |
| Background/rationale | 2 | To evaluate the significance of the Borrmann type combined with vessel invasion status on the prognosis of advanced gastric cancer. |
| Objectives | 3 | To evaluate the significance of the Borrmann type combined with vessel invasion status on the prognosis of advanced gastric cancer. |
| **Methods** |  |  |
| Study design | 4 | This retrospective study included 2604 patients with advanced gastric cancer who underwent gastric cancer resection at the Gastrointestinal Surgery Department in Harbin Medical University Cancer Hospital from January 2009 to December 2013. |
| Setting | 5 | This retrospective study included 2604 patients with advanced gastric cancer who underwent gastric cancer resection at the Gastrointestinal Surgery Department in Harbin Medical University Cancer Hospital from January 2009 to December 2013. |
| Participants | 6 | We excluded the following patients: (1) patients undergoing neoadjuvant chemotherapy or perioperative radiochemotherapy; (2) patients with other gastric tumors (lymphoma, stromal tumor, residual gastric cancer, etc.) and other malignant tumors (cancer, colorectal cancer, etc.); (3) patients undergoing palliative surgery; (4) patients with gastric stump cancer; and (5) patients with Borrmann type V gastric cancer. After excluding these factors, a total of 2604 patients were included in the study. |
| Variables | 7 | Not applicable |
| Data sources/ measurement | 8\* | The data is this study is from the database of gastrointestinal surgery in Cancer Hospital. |
| Bias | 9 | However, as previous report , adjuvant chemotherapy regimens have changed significantly in the past of decades, which has led to heterogeneity in chemotherapy, number of cycles, and treatment regimens. Therefore, the details of adjuvant chemotherapy were not considered for statistical analysis in this study. |
| Study size | 10 | This retrospective study included 2604 patients with advanced gastric cancer who underwent gastric cancer resection at the Gastrointestinal Surgery Department in Harbin Medical University Cancer Hospital from January 2009 to December 2013. |
| Quantitative variables | 11 | The data includes demographics, clinicopathological features, diagnosis, surgical records, postoperative results, and follow-up visit. |
| Statistical methods | 12 | The clinical data related to the patients were input into the commercially available software SPSS 22.0, which was used for statistical analysis. Categorical variables were evaluated by the Pearson X2 test; continuous data are expressed as average values, and the Student's t-test was used to evaluate significant differences between average values. The Kaplan-Meier method was used to identify differences in cumulative survival rates; multivariate prognostic analysis was performed using the Cox proportional risk model, and a P value <0.05 was considered statistically significant. |

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| **Results** |  |  |
| Participants | 13\* | Of the 2604 patients with advanced gastric cancer included in this study, 1939 were male (74.4%), and 665 were female (25.6%). |
| Descriptive  data | 14\* | The median age was 60 years old. Among these patients, 1586 (60.9%) underwent distal gastrectomy, and 234 (9.0%) and 784 (30.1%) underwent proximal gastrectomy and gastrectomy, respectively. There were 123 patients classified as Borrmann type I (4.7%), 464 as Borrmann type II (17.8%), 1663 as Borrmann type III (63.8%), and 354 as Borrmann type IV (13.5%). The overall positive rate of LBVI was 16.9%, and the incidence of LBVI (+) in Borrmann types I, II, III, and IV was 13.8%, 20.4%, 15.0%, and 22.5% |
| Outcome data | 15\* | Regarding the prognostic survival of patients, through univariate survival analysis, we found that some clinicopathological variables were significantly related to the survival rate, including Borrmann classification (P = 0.000), vessel invasion (P = 0.000), tumor location (P = 0.000), tumor size (P = 0.000), histological type (P = 0.000), pT stage (P = 0.000), pN stage (P = 0.000), surgical method (P = 0.000), degree of radical surgery (P = 0.000), and treatment with combined resection (P = 0.000). In addition, multivariate Cox regression analysis showed Borrmann classification (P = 0.023), vascular invasion (P = 0.000), tumor size (P = 0.012), pT stage (P = 0.000), pN stage (P = 0.000), and degree of radical surgery (P = 0.000) were independent prognostic factors (see Table 3). |
| Main results | 16 | Figure 1a shows that the 5-year survival rate was significantly different among Borrmann I-IV patients (P = 0.000), and Figure 1b shows that the 5-year survival rate of LBVI (+) patients was significantly lower than that of LBVI (-) patients (P = 0.000). Then, we analyzed the effect of the combination of the Borrmann type and LBVI on the 5-year survival of patients. The results showed that when the patient was classified as Borrmann III, the presence or absence of LBVI had a significant impact on survival (16.4% <29.1%, P = 0.000, Figure 2c), and the presence or absence of LBVI did not make a significant difference in the 5-year survival rates of Borrmann I, II, and IV patients (P = 0.660, P = 0.281, P = 0.793, Figures 2a, 2b, and 2d). We also found a more interesting phenomenon. Patients with Borrmann III + LBVI (+) and Borrmann IV + LBVI (-) had similar 5-year survival rates (16.4% vs 13.1%, P = 0.065, Figure 3a). Furthermore, patients with Borrmann IV + LBVI (+) had a similar 5-year survival rate to the 2 groups above (16.4% vs 11.2%, P = 0.112, Figure 3b). |
| Other analyses | 17 | We also conducted a subgroup analysis to determine whether the depth of tumor invasion and tumor location affected the above results. The results showed that regardless of whether the patients had pT2, pT3, pT4a or pT4b disease, the 5-year survival rates of patients with Borrmann III + LBVI (+) and Borrmann IV + LBVI (-) were not significantly different (P = 0.368, P = 0.202 P = 0.058, P = 0.314, Figure 4). When the tumor position was the upper 1/3, middle 1/3, or lower 1/3 of the stomach or when there were overlapping positions, there was a significant difference in the 5-year survival rate between patients with Borrmann III + LBVI (+) and those with Borrmann IV + LBVI (-) (P = 0.205, P = 0.928, P = 0.301, P = 0.532, Figure 5). |
| **Discussion** |  |  |
| Key results | 18 | Regarding the prognostic survival of patients, through univariate survival analysis, we found that some clinicopathological variables were significantly related to the survival rate, including Borrmann classification (P = 0.000), vessel invasion (P = 0.000), tumor location (P = 0.000), tumor size (P = 0.000), histological type (P = 0.000), pT stage (P = 0.000), pN stage (P = 0.000), surgical method (P = 0.000), degree of radical surgery (P = 0.000), and treatment with combined resection (P = 0.000). In addition, multivariate Cox regression analysis showed Borrmann classification (P = 0.023), vascular invasion (P = 0.000), tumor size (P = 0.012), pT stage (P = 0.000), pN stage (P = 0.000), and degree of radical surgery (P = 0.000) were independent prognostic factors (see Table 3). |
| Limitations | 19 | This study still has some limitations. First, our results only represent a retrospective study of our single center, which leads to the existence of heterogeneity and internal deviations. Second, due to the small number of patients undergoing neoadjuvant chemotherapy at the time, we did not routinely analyze this variable; in addition, although many patients underwent postoperative systemic adjuvant chemotherapy during the study period, there was a lack of standardized treatment options for patients with tumors. The differential feedback between patients may lead to changes in the treatment plan, so we have not provided sufficient evidence on postoperative adjuvant chemotherapy. |
| Interpretation | 20 | At present, many researchers have published a large number of reports to explore the factors that affect the prognosis of gastric cancer. In general, some clinicopathological factors, such as tumor stage and grade, have been recognized as the most critical indicators that affect postoperative survival [13]. However, there are also a large number of articles showing that the Borrmann classification (Type I-IV) has contributed to the macroscopic classification of advanced gastric cancer, and this classification has been accepted worldwide [14]. LBVI (+) status is associated with a poor postoperative prognosis of gastric cancer, for patients with either positive or negative lymph nodes [15]. Previous studies have shown that the effectiveness of therapy for patients with early gastric cancer is relatively good, and the 5-year survival rate after surgery is higher than 90%. However, patients with advanced gastric cancer usually have a poor prognosis, and the 5-year survival rate is less than 30% [16]. Therefore, we hope to predict the prognosis of gastric cancer patients by jointly analyzing two simple and effective clinical indicators, the Borrmann classification and LBVI status, thereby helping clinicians formulate more accurate treatment plans. |
| Generalisability | 21 | In conclusion, the Borrmann classification, vascular invasion status, tumor size, pT stage, pN stage, and degree of radical surgery all independently affected prognosis in this study. According to our results, patients with Borrmann III + LBVI (+) have similar 5-year survival rates to those with Borrmann IV + LBVI (-) and patients with Borrmann IV + LBVI (+). Therefore, we recommend that clinicians should carry out a comprehensive multidisciplinary, multimodal and individualized treatment plan when they encounter Borrmann III + LBVI (+) patients, regardless of the pT stage and tumor location, to obtain better survival results. |
| **Other information** | | |
| Funding | 22 | Not applicable |

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at [http://www.plosmedicine.org/,](http://www.plosmedicine.org/) Annals of Internal Medicine at [http://www.annals.org/,](http://www.annals.org/) and Epidemiology at [http://www.epidem.com/).](http://www.epidem.com/)) Information on the STROBE Initiative is available at [www.strobe-statement.org.](http://www.strobe-statement.org/)