Treatment and survival outcomes from epithelial ovarian cancer in women aged 65 years or older

Chenchen Zhu1,*, Hanyuan Liu1,*, Zhen Shen2, Yanhu Xie3, Tianjiao Zhang2, Björn Nashan4, Dabao Wu2, Ying Zhou1,2

1Department of Obstetrics and Gynecology, Anhui Provincial Hospital, Anhui Medical University, 230001, Hefei
2Department of Obstetrics and Gynecology, the First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, 230001, Hefei
3Department of Anesthesiology, the First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, 230001, Hefei
4Organ Transplantation Center, the First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, 230001, Hefei (China)

Summary

Objective: To describe the clinical features associated with the treatment and survival outcomes of older women with epithelial ovarian cancer. Materials and methods: Fifty-five women aged ≥ 65 years and diagnosed with epithelial ovarian cancer were enrolled. The clinical characteristics, treatment procedure and survival outcomes were presented and analyzed. Results: The mean age at the time of epithelial ovarian cancer diagnosis was 69.9 ± 3.9 years, with most women presenting with advanced stage disease (83.6%). Thirty-five patients (63.6%) received initial cytoreduction, of whom 23 underwent surgery with a low surgical complexity score. Forty-two percent of patients presented with postoperative complications, while five patients presented with three or more postoperative complications simultaneously. The major factors associated with reduced overall survival were the factors associated with reduced overall survival (p < 0.0001, p = 0.004). Conclusions: Aggressive surgical debulking and chemotherapy are feasible for older epithelial ovarian cancer patients. Advanced FIGO stage and residual lesions were associated with reduced survival.

Key words: Geriatric patients; Epithelial ovarian cancer; Cytoreduction; Chemotherapy; Survival.

Introduction

Ovarian cancer is the fifth leading cause of cancer-related death among women worldwide [1], with epithelial ovarian cancer (EOC) being the most common type of ovarian cancer. The median age of women diagnosed with EOC is 63 years [2] and approximately 70% of older patients (defined as > 65 years old) [3] are diagnosed as stage III ~ IV [4]. Thus, older patients often face complex treatment courses. Since older patients are often excluded from clinical trials, there is little information to guide physicians seeking the optimal strategy for such EOC patients. In addition, with increasing life expectancies many older patients can tolerate extensive surgery and challenging courses of chemotherapy. This leaves physicians facing a dilemma and lacking appropriate assessment protocols and criteria for surgery and chemotherapy.

Primary debulking surgery followed by adjuvant platinum-based chemotherapy is the standard treatment for advanced ovarian cancer. Removal of all gross residual disease is associated with improved survival of ovarian cancer patients, and the median survival is more than 50 months [5, 6]. Older patients may have problems often not present in the younger patient population. They more frequently have comorbidities, as well as impairments in personal aspects of daily living, cognitive impairments, and geriatric special syndromes [7]. These challenges have led to older women being treated less aggressively than younger patients even in the absence of co-morbidities. However, several studies have found that the poor prognosis of older women with EOC is mainly due to the suboptimal and less radical management, without consideration of their biological status [8-10]. Older patients usually receive delayed and dose-reduced chemotherapy [11,12]. With the development of appropriate anesthesiology, perioperative care, and surgical techniques, older patients without serious comorbid conditions can receive the standard treatments recommended for younger patients without increased postoperative complications and mortality [13]. Thus it is recommended that patients over 65 receive complete cytoreduction and routine chemotherapy whenever possible [14,15].

In this study, we conducted a retrospective analysis of the clinical features, treatment and survival outcomes of older...
patients with EOC in our clinical practice. We also sought to identify the factors associated with better prognosis and survival.

Table 1. — Clinical and pathology characteristics of 55 geriatric patients with epithelial ovarian cancer received surgeries in our hospital.

| No. %        |
|--------------|
| Total        | 55            |
| Age (Mean ± SD) | 69.91 ± 3.96  |
| 65-69       | 31 (56.36)    |
| 70-74       | 15 (27.27)    |
| > 75        | 9 (16.36)     |
| FIGO stage  |              |
| I           | 8 (14.55)     |
| II          | 1 (1.82)      |
| III         | 42 (76.36)    |
| IV          | 4 (7.27)      |
| Pathological type |       |
| Serous      | 44 (80)       |
| Mucinous    | 5 (9.09)      |
| Endometriosis | 0 (0)        |
| Clear cell  | 6 (10.91)     |
| Comorbid illnesses | 29 (52.73) |
| Multiple comorbid | 10 (18.18) |
| Disease type |              |
| Primary     | 53 (96.36)    |
| Recurrent   | 2 (3.64)      |
| Adjuvant Chemotherapy | 48 (87.27) |
| < 6         | 32 (58.18)    |
| ≥ 6         | 23 (41.82)    |
| Resistance  | 7 (14.58%)    |
| Relapse     | 23 (41.82)    |

* 7(14.58%) patients developed resistance among the 48 patients receiving adjuvant chemotherapy, not among the 55 patients.

Table 2. — Type of comorbid illnesses.

| No. (%)        |
|---------------|
| Hypertension  | 16 (29.09) |
| Coronary artery disease | 8 (14.55) |
| Diabetes      | 8 (14.55)  |
| Other cancer  | 2 (3.64)   |
| Other illnesses | 5 (9.09)  |

* 1 case of breast cancer, 1 case of gastric cancer, b. 1 case of old tuberculosis, 1 case of post-cholecystectomy, 1 case of kidney transplant (donor), 1 case of hepatic hemangioma, 1 case of venous thrombosis.

Table 3. — Surgical procedures and operative outcome in 55 geriatric patients with epithelial ovarian cancer.

| No. %        |
|--------------|
| Surgery      | 55 (100)    |
| Staging Surgery | 4 (7.27)    |
| PCS          | 39 (70.91)  |
| ICS          | 7 (12.73)   |
| Other        | 5 (9.09)    |
| Residual disease |          |
| R0a         | 29 (52.73)  |
| R1b         | 6 (10.91)   |
| RXc         | 20 (36.36)  |
| ASA          |             |
| 1           | 2 (3.64)    |
| 2           | 30 (54.54)  |
| 3           | 23 (41.82)  |
| CSG          |             |
| Low         | 43 (78.18)  |
| Intermediate | 10 (18.18)  |
| High        | 2 (3.64)    |
| Postoperative complications | 23 (41.82) |
| Estimated blood loss (EBL) | 775.09 ± 758.31 |
| < 500       | 25 (45.45)  |
| 500-999     | 15 (27.27)  |
| 1000-1999   | 9 (16.36)   |
| ≥ 2000      | 6 (10.91)   |
| Intraoperative Transfusion | 26 (47.27) |
| Total hospital stay | 20.38 ± 10.33 |
| Postoperative hospital stay | 12.93 ± 5.15 |
| < 10        | 15 (27.27)  |
| 10-19       | 32 (58.18)  |
| 20-29       | 7 (12.73)   |
| ≥ 30        | 1 (1.82)    |
| Postoperative interval of initial chemotherapy | 15.84 ± 9.95 |
| No chemotherapy | 5 (9.09)  |
| < 10        | 19 (34.55)  |
| 10-19       | 14 (25.45)  |
| 20-29       | 11 (20)     |
| ≥ 30        | 6 (10.91)   |

* 1 case of breast cancer, 1 case of gastric cancer, b. 1 case of old tuberculosis, 1 case of post-cholecystectomy, 1 case of kidney transplant (donor), 1 case of hepatic hemangioma, 1 case of venous thrombosis.

Materials and Methods

Data on all women (n = 55) diagnosed with EOC between January 2005 and June 2018 were extracted from the
Figure 1. — The inclusion process and treatment process of patients recruited in this study. #: two cases of recurrent EOC underwent secondary cytoreduction, three cases of biopsy. EOC: Epithelial ovarian cancer; NACT: Neoadjuvant chemotherapy.

Figure 2. — A. Kaplan-Meier estimate of overall survival and progression-free survival by patients’ age.

Figure 3. — Kaplan-Meier estimate of overall survival and progression-free survival by FIGO stage.

Figure 4. — Kaplan-Meier estimate of overall survival and progression-free survival by the score of ASA.
medical records of the First Affiliated Hospital of University of Science & Technology of China. Patients confirmed to have a diagnosis of EOC after surgery were eligible unless they had a prior ovarian cancer treatment, a history of oophorectomy, an unresectable mass, incomplete required data, or pregnancy at presentation. The inclusion process and treatment process of patients recruited in this study are presented in Figure 1. The clinical and pathology characteristics of the study patients are shown in Table 1. This study was approved by the ethics review board of Anhui Provincial Hospital, file # 2018KY52.

Data collected from patient records included clinical characteristics, surgical treatment details, post-operative treatment, and outcomes. Clinical characteristics included age, tumor histology and grade, FIGO stage, comorbidities, scores of American Society of Anesthesiologists (ASA) class, imaging, and laboratory test results. Surgical treatment details included the surgical procedure used, ascites volume, estimated blood loss, intraoperative transfusion, diameter of largest residual lesion, and surgical complexity score group (CSG). Post-operative treatment characteristics included postoperative complications, the length of total and postoperative hospital stay, the postoperative interval of initial chemotherapy, regimen of chemotherapy and number of cycles. Outcomes included platinum sensitivity, adverse events, time to progression, and date of last follow-up or death.

Tumor stage was based on pathological stage information and the International Federation of Gynecology and Obstetrics (FIGO) system, supplemented by clinical stage information if pathological stage was unavailable or unknown. In the case of neoadjuvant chemotherapy, tumor stage was recorded based on clinical stage information only. Histologic type was recorded based on the World Health Organization classification system. Optimal surgery was defined as no residual tumor (R0) or residual tumor of less than 1 cm in diameter (R1). Residual tumors of more than 1 cm in diameter (RX) were classified as suboptimal debulking.

Chemotherapy regimens were given as individual therapy with platinum and paclitaxel in different regimens. Complete blood cell counts and serum biochemistry tests were performed the day before administration of chemotherapy and after chemotherapy infusion. Response to primary chemotherapy was determined by imaging results and serum CA-125 levels.

For follow-up, patients generally visited every three months for the first two years and every six months thereafter. At each visit they received a pelvic examination and a serum CA-125 test. Abdominal ultrasound scans were performed every six months, while computed tomography of the whole abdomen and chest X-ray were performed annually unless a relapse was suspected. Progression of disease and ovarian cancer–related deaths were recorded at each follow-up visit.

Kaplan–Meier and log-rank tests were used to estimate progression-free (PFS) and overall survival (OS). These were calculated from the date of initial cytoreductive surgery to the date at which progression was recorded, or date of last progression-free follow-up visit or death. All statistical tests were two-sided, with \( p \) values < 0.05 considered statistically significant. Data analyses were performed with Graph Pad Prism 6.0 and SPSS 16.0.

Results

**Patients and clinical characteristics**

The clinical and pathological characteristics of the 55 EOC study patients are shown in Table 1. The women were all ≥ 65 years of age, with 43.6% being ≥ 70 years. Fifty-three patients were being treated for EOC as a primary diagnosis, and two for recurrent EOC. Most presented with ad-
Table 5. — Simultaneous occurrence of three or more surgical complication.

| No | Age | Stage | Residual lesions | Surgery | Complications                                                                 | Status      | Overall survival |
|----|-----|-------|------------------|---------|--------------------------------------------------------------------------------|-------------|------------------|
| 1  | 67  | IIIc  | Low              | RX      | PCS                                                                            | Hypoproteinemia, hyponatremia, renal dysfunction, ventosity | Died        | 18               |
| 2  | 72  | IIIc  | Low              | RX      | PCS                                                                            | Hypoproteinemia, ascites, Deep venous thrombosis          | Died        | 22               |
| 3  | 67  | IIIc  | Low              | RX      | PCS                                                                            | Ventosity, Nausea and vomiting, arrhythmia                | Died        | 42               |
| 4  | 78  | IIIc  | Low              | R0      | ICS                                                                            | Hypoproteinemia, ascites, Hypokalemia, Nausea and vomiting, Diarrhea | Died        | 35               |
| 5  | 67  | IIIc  | Low              | R0      | ICS                                                                            | Wound dehiscence, Ileus, Pulmonary infection, Deep venous thrombosis | Survival    | 8                |

R0, optimal cytoreduction with no residual macroscopic disease; RX, suboptimal cytoreduction with residual macroscopic disease > 2 cm; PCS, primary cytoreductive surgery; ICS, interval cytoreductive surgery.

Perioperative procedure

All patients received surgical treatment, the details of which are presented in Table 3. Three patients received pelvic peritoneal or omental biopsies as their only surgical treatment. Both of the recurrent EOC patients underwent surgeries allowing for optimal secondary cytoreduction.

The majority of patients (63.6%) received optimal cytoreduction, with 20 (36.3%) receiving conservative treatment or non-optimal debulking. Cases where optimal cytoreduction could not be achieved included one case of palliative interval cytoreductive surgery (tumor involved in the root of small bowel mesentery), three women who received biopsies only, and sixteen women who received primary palliative cytoreductive surgery. Fifteen of the 20 cases had an ASA score of three.

Among the 35 patients who received optimal cytoreduction at debulking surgery, 23 (65.7%) underwent surgery with a low CSG because of comorbid diseases (60.8%) or because of senile age (71.30 ± 4.23). Only two patients received optimal cytoreduction with high CSG. Both were 65 years old and diagnosed with high-grade serous ovarian cancer at stage IV and an ASA score of three. One underwent resection of uterus, bilateral adnexal, omentum, para-aortic lymph nodes, bladder retrograde peritoneum, pelvic floor peritoneum, partial rectum, and sigmoid colon, as well as sigmoid colorectal anastomosis. This patient received initial chemotherapy eight days after operation, then finished adjuvant chemotherapy for six times. After two courses of neoadjuvant chemotherapy, the other patient underwent resection of the uterus, bilateral adnexal, omentum, appendix, partial diaphragmatic surface, abdominal pelvic peritoneal, and a sigmoid colon resection as well as colorectal anastomosis. She completed four courses of adjuvant chemotherapy. Both these patients had no serious surgical complications, no disease progression was detected, and both were still alive at the conclusion of the study.

Twenty-three patients presented postoperative complications (Table 4), of which hypoproteinemia was the most common (18.18%). Five patients had three or more kinds of postoperative complications simultaneously (Table 5). All complications resolved with treatment, and there were no deaths due to serious complications. 49(89.09%) of the patients left hospital within 20 days of surgery, and 19 patients (34.5%) began an initial round of chemotherapy within 10 days of their initial surgical treatment.

Chemotherapy

Following surgery, 48 (87.3%) patients received chemotherapy. Among these, 7 developed resistance and 23 cases relapsed. Only 23 (41.8%) women completed all six prescribed rounds of chemotherapy. Eight patients received neoadjuvant chemotherapy and 7 underwent interval cytoreductive surgery followed by adjuvant chemotherapy. One patient underwent only a biopsy and received no postoperative chemotherapy. Among the 7 patients who received neoadjuvant chemotherapy in this study, 4 achieved R0 surgery, two presented with grade1 (G1) hematologic toxicity and the others reported no side effects. Side effects from chemotherapy were reported by 56.2% (27/48) of patients and included 21 cases of hema-
tologic toxicity and 10 cases of G3-G4 myelosuppression. No deaths were attributed to chemotherapy in this cohort.

Survival analysis

All patients were followed up in the clinic or by telephone. The survival analyses included only patients who had reached a follow-up period of more than two years at the end of our study. Ten patients who had been treated for less than two years prior to our analyses were not included in the survival analysis. Of the 45 EOC patients who followed up lasting over two years and were included in the survival analyses, the median OS and PFS were 43.0 months (95% CI: 35.8-50.2 months) and 18 months (95% CI: 10.2-25.8 months) respectively. Kaplan–Meier curves showing OS and PFS for the 45 patients according to age, FIGO stage, score of ASA and residual lesions are presented in Figure 2, 3, 4 and 5. These analyses revealed that FIGO stage (Figure 3), and residual lesions (Figure 5) were significantly associated with OS. In addition, FIGO stage was associated with PFS (Figure 3). The diameter of residual lesions after surgery was not associated with PFS, but was related to OS (Figure 5). Sixty percent of women survived at least two years and 52.7% survived at least three years. The rate of two-year PFS was 35.56% and three-year PFS was 33.33%.

Discussion

Therapeutic management of elderly patients with EOC is challenging and requires a balance between complete cytoreduction to enhance survival, and the prevention of postoperative severe complications leading to death. According to The Surveillance, Epidemiology, and End Results (SEER) Program, rates of optimal surgery decrease with patient age (< 60 years old: 43.7%; 60 to 79 years: 29.5%; ≥ 80 years old: 21.7%), and this results in increased mortality [8]. We found that postoperative residual tumors predict both OS and PFS among older patients with ovarian cancer. Older patients tolerate surgery well in our experience, with acceptable levels of complications and a mortality rate similar to that of younger patients [16]. Geriatric patients with ovarian cancer therefore deserve maximal surgical effort. In the present study, the majority of patients had a low or intermediate CSG, with only two patients having high CSG. Improvements in the fields of anesthesiology, perioperative care, and surgical techniques have increased the rate of operability and safety of surgery for older patients [17]. It has been reported that super upper abdominal surgery can be carried out even in older patients, however the complexity of surgery for older patients is greatly increased as well as the prognosis [18]. We also demonstrated that the association of stage with OS and PFS holds for older patients with ovarian cancer.

Sharma et al. showed that patients with comorbid conditions are able to tolerate radical procedures without an increase in postoperative complications[19]. In our study, although most patients (52.7%, 29/55) presented with at least one comorbid illness, no deaths occurred within 30 days of surgery. Among the 35 patients with optimal debulking, despite the presence of comorbid illness (18/38, 47.37%), they were able to achieve optimal debulking with a low postoperative mortality. The mean ASA score of patients that received conservative treatment or underwent non-optimal debulking was 2.6. ASA scores have previously been reported to influence survival [20], however in our study there were no significant associations between ASA and either OS (p = 0.42) or PFS (p = 0.27).

Prior studies have found the poor prognosis of older women with ovarian cancer was related to less use of chemotherapy [21]. Older patients can tolerate aggressive single agent and combination chemotherapy treatment [22], and paclitaxel plus platinum-based chemotherapy has been shown effective in the treatment of older patients with ovarian cancer [8,14,23]. Even though it has been demonstrated that completion of chemotherapy is associated with survival [24], just over half (51.2%; 32/48) of the patients treated with chemotherapy in the present study received less than the recommended six courses. Failure to complete six courses of chemotherapy was not associated with statistically significant differences in OS (p = 0.770) or PFS (p = 0.548) compared to those who completed therapy. We speculate this is probably due to the diversity of chemotherapy regimens included in this study. In addition, failure to complete courses was not the result of side effects due to treatment (p > 0.05) in this study population. Prior studies have demonstrated that toxicity does not significantly increase with age [21]. Villela et al. reported that older patients tolerate combination chemotherapy without increased rates of grade 3 and 4 toxicities when treated with paclitaxel and carboplatin [25]. As a result, we suspect the poor survival of older EOC patients is the result of inadequate chemotherapy rather than toxicity from this treatment.

Limitations of this study include the retrospective design, the relatively small number of patients, and the possibility of selection bias limiting the ability to generalize the findings. In principle, adequate treatment is possible in most cases even in the presence of comorbidities, hence advanced age should not be considered a contraindication for appropriate treatment. Adequate treatment for older patients with ovarian cancer is very important due to the aging world population, especially in China. In conclusion, this study suggests that older patients can achieve satisfactory outcomes with aggressive surgical debulking and optimal chemotherapy treatment.

Conclusion

Older EOC patients can achieve satisfactory prognosis provided that aggressive surgical debulking and chemotherapy are feasible. FIGO stage and residual lesions were both significantly associated with survival.

Acknowledgments

This work was supported by the National Natural Science Foundation of China (81872110, 81272881, 81902632), Anhui Provincial Key Research and Devel-
opment Program (1704a0802151), National Key Research and Development Program (2018YFC1003900), and the Open Project of the CAS Key Laboratory of Innate Immunity and Chronic Disease Project (KLIICD-201603). Anhui provincial innovative programme for organ transplantation (S20183400001). The funders had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Conflict of interest

The authors declare that there is no conflict of interest.

Submitted: June 08, 2019
Accepted: September 05, 2019
Published: June 15, 2019

References

[1] Siegel R.L., Miller K.D., Jemal A.: "Cancer statistics, 2019". CA Cancer J. Clin., 2019, 69, 7.

[2] Salazar C., Campbell I.G., Goringre K.L.: "When Is "Type I" Ovarian Cancer Not "Type I"? Indications of an Out-Dated Dichotomy". Front. Oncol., 2018, 8, 654.

[3] Huang Z., Zheng Y., Wen W., Wu C., Bao P., Wang C., et al.: "Incidence and mortality of gynaecological cancers: Secular trends in urban Shanghai, China over 40 years". Eur. J. Cancer, 2016, 65, 1.

[4] Hogdall E.: "Approaches to the detection of ovarian cancer". Scand J. Clin. Lab. Invest. Suppl., 2016, 245, 49.

[5] Bristow R.E., Tomacruz R.S., Armstrong D.K., Trimble E.L., Montz F.J.: "Survival effect of maximal cytoreductive surgery for advanced ovarian carcinoma during the platinum era: a meta-analysis". J. Clin. Oncol., 2002, 20, 1248.

[6] Chi D.S., Eisenhauer E.L., Zivanovic O., Sonoda Y., Abu-Rustum N.R., Levine D.A., et al.: "Improved progression-free and overall survival in advanced ovarian cancer as a result of a change in surgical paradigm". Gynecol. oncol., 2009, 114, 26.

[7] Troso-Sandoval T.A., Lichtman S.M.: "Chemotherapy of ovarian cancer in elderly patients". Cancer Biol. Med., 2015, 12, 292.

[8] Giri S.K., Nayak B.: "Management of Ovarian Cancer in Elderly". Rev. Recent Clin. Trials., 2015, 10, 270.

[9] Sabatier R., Calderon B., Lambaudie E., Chereau E., Provansal M., Cappiello M.-A., et al.: "Prognostic Factors for Ovarian Epithelial Cancer in the Elderly". Int. J. Gynecol. Cancer, 2015, 25, 815.

[10] Bristow R.E., Tomacruz R.S., Armstrong D.K., Trimble E.L., Montz F.J.: "Survival effect of maximal cytoreductive surgery for advanced ovarian carcinoma during the platinum era: a meta-analysis". J. Clin. Oncol., 2002, 20, 1248.

[11] Joseph N., Clark R.M., Dizon D.S., Lee M.S., Goodman A., Jr B.D., et al.: "Delay in chemotherapy administration impacts survival in elderly patients with epithelial ovarian cancer". Gynecol. oncol., 2015, 137, 401.

[12] Larbi E., Madhuri K., Essapen S., Butler-Manuel S., Tailor A., Michael A.: "Chemotherapy for epithelial ovarian cancer and primary peritoneal carcinoma". Clin. Oncol.(R Coll Radiol), 2013, 25, 75.

[13] Fanfani F., Fagotti A., Salerno M.G., Margariti P.A., Gagliardi M.L., Gallotta V., et al.: "Elderly and very elderly advanced ovarian cancer patients: does the age influence the surgical management"? Eur. J. Surg. Oncol., 2012, 38, 1204.

[14] Johnson S.J., Sorg R.A., Borker R.D., Mei S.D.: "Chemotherapy Treatment Patterns in Elderly Patients Initially Diagnosed With Advanced Ovarian Cancer. Clin. Ovar. Gynecol. Cancer, 2012, 5, 67.

[15] Steer C.B.: "Chemotherapy for ovarian cancer in the older adult". Curr. Treat. Options Oncol., 2009, 10, 159.

[16] Cafa E.V., Pecorino B., Sciubilla G., Scillo P.: "Role of Surgery in the Elderly Patients Affected from Advanced Stage Ovarian Cancer". J. Cancer Ther, 2015, 6, 428.

[17] Lim M.C., Kang S., Song Y.J., Park S.H., Park S.Y.: "Feasibility and safety of extensive upper abdominal surgery in elderly patients with advanced epithelial ovarian cancer". J. Korean Med. Sci. 2010, 25, 1034.

[18] Fotopoulos C., Savvatis K., Steinhagen-Thiessen E., Bahra M., Lichtenegger W., Sehoulji J.: "Primary radical surgery in elderly patients with epithelial ovarian cancer: analysis of surgical outcome and long-term survival". Int. J. Gynecol. Cancer, 2010, 20, 34.

[19] Sharma S., Driscoll D., Odunsi K., Venkatadri A., Lele S.: "Safety and efficacy of cytoreductive surgery for epithelial ovarian cancer in elderly and high-risk surgical patients". Am. J. Obstet. Gynecol. 2005, 193, 2077.

[20] Aletti G.D., Dowdy S.C., Podratz K.C., Ciby W.A.: "Relationship among surgical complexity, short-term morbidity, and overall survival in primary surgery for advanced ovarian cancer". Am. J. Obstet. Gynecol. 2007, 197, 676.

[21] Pignata S.: "Ovarian cancer in the elderly". Crit. Rev. Oncol./Hemat. 2004, 49, 77.

[22] Uyar D., Frasure H.E., Markman M., von Gruenigen V.E.: "Treatment patterns by decade of life in elderly women (≥ or = 70 years of age) with ovarian cancer". Gynecol. Oncol., 2005, 98, 403.

[23] Zola P., Ferrero A.: "Is carboplatin-paclitaxel combination the standard treatment of elderly ovarian cancer patients"? Ann. Oncol. 2007, 18, 213.

[24] Winberger P., Lehmann N.R., Burges A., Meier W., Hoppenau B., Du B.A.: "Impact of age on outcome in patients with advanced ovarian cancer treated within a prospectively randomized phase III study of the Arbeitsgemeinschaft Gynaekologische Onkologie Ovarian Cancer Study Group (AGO-OVAR)". Gynecol. Oncol. 2006, 100, 300.

[25] Vilella J.A., Chaudhry T., Pearl M.L., Valey F., DiSilvestro P.A., Pollack S., Chalas E.: "Comparison of tolerance of combination carboplatin and paclitaxel chemotherapy by age in women with ovarian cancer". Gynecol. Oncol., 2002, 86, 316.

Corresponding Author:
YING ZHOU, M.D.
Department of Obstetrics and Gynecology, Anhui Provincial Hospital, Anhui Medical University; Department of Obstetrics and Gynecology, The First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, Hefei, Anhui Province 230001 (China)
E-mail: caddie1234@gmail.com