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Herbal Medicine and Surgery

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Herbal remedies (phytomedicines) possess significant pharmacological activity and consequently potential adverse effects and drug interactions. The explosion in sales of herbal therapies has brought products to the marketplace that do not conform to the standards of safety and efficacy that physicians and patients expect. Relatively few physicians inquire about herbal medicine use, and up to 70% of patients do not reveal their use of herbal medicines to their physicians and pharmacists. All physicians should question patients regarding the use of herbal remedies and document their responses in the medical record. They should caution patients that lack of standardization, quality control, and regulation may result in variability in herbal content, efficacy, and potential contamination. Physicians should be aware of potential adverse reactions stemming from herbal medicine use, especially with regard to perioperative bleeding, cardiovascular instability, and interactions with commonly prescribed sedative–hypnotic agents.
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Herbal medicines (phytomedicines) are medicinal products that contain plant materials as their pharmacologically active components.[1] For many herbal medicines, the specific ingredients that determine the pharmacologic activity of the product are as yet incompletely characterized. While herbal remedies possess many beneficial effects, they may also result in adverse effects or drug interactions. Recent articles in peer-reviewed medical journals have acknowledged herbal medicine's unique position in the growing field of complementary and alternative medicine (CAM) and have provided a context for clinicians to approach patients using herbal medicines.[2-5] However, relatively few physicians question patients regarding their use of herbal medicines, and up to 70% of patients do not reveal their use of herbal medicines to their physicians and pharmacists.[6] Moreover, many herbal medications are now added to vitamins and may be taken without complete awareness by much of the population.

Herbal medicine use is common among surgical patients. Reports estimate its prevalence from 22 to 60% among select adult surgical populations[7-9] and 12.8% in pediatric surgical patients.[10] The use of herbal medicines may increase the risk of adverse effects through several mechanisms, including direct pharmacological effects, interactions with conventional prescribed drugs, and through the effects of unlisted contaminants in herbal preparations. Moreover, the polypharmacy and physiologic alterations characteristic of surgery may increase the risk of morbidity and mortality associated with the use of herbal medicines.[11] This report reviews the existing data on known and suspected effects of herbal medicine use in the perioperative period.

Direct Pharmacological Effects

Bleeding

Physicians commonly question patients with regard to aspirin use, yet few explore the use of herbal remedies among their patients contemplating surgery. All surgeons should question patients regarding the use of the following common herbal remedies, which may potentially increase the risk of bleeding during surgical procedures: garlic, ginkgo, Asian ginseng, ginger, and feverfew. A partial listing of other herbal medicines that may increase bleeding time is provided in Table 1.[12]

Garlic (*Allium sativum*) has been widely promoted as a cure for colds, coughs, flu, chronic bronchitis, whooping cough, ringworm, asthma, intestinal worms, fever, and digestive, gallbladder, and liver disorders. Investigators have explored its use as a treatment for mild hypertension[13] and hyperlipidemia,[14] although a recent trial did not demonstrate its ef-

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Table 1 Some Medicinal Plants Potentially Associated with Increased Risk of Bleeding

Coumarin-containing plants
Danshen (*Salvia miltiorrhiza*)
Dong quai (*Angelica sinensis* syn *A polymorpha*)
Horse chestnut bark (*Aesculius hippocastanum*)
Sweet clover plant (*Melilotus officianalis, M. alba*)
Sweet vernal grass leaves (*Anthoxanthum odoratum*)
Sweet-scented bedstraw plant (*Galium triflorum*)
Tonka bean seeds (*Dipteryx odorata, D. oppositifolia*)
Vanilla leaf leaves (*Trilisa odoratissima*)
Woodruff plant (*Asperula odorata*)
Salicylate-containing plants
Black Cohosh rhizome (*Cimicifuga racemosa*)
Meadowsweet flower (*Filipendula ulmaria = Spiraea ulmaria*)
Poplar bark and/or buds (*Populus* spp.)
Sweet birch bark (*Betula lenta, B. pendula*)
Willow bark (*Salix* spp.)
Wintergreen leaves (*Gaultheria procumbens*)
Plants inhibiting platelet function
Bromelain (*Ananas comosus*)
Cayenne fruit (*Capsicum frutescens*)
Chinese skullcap root (*Scutellaria baicalensis*)
Dan shen root (*Salvia miltiorrhiza*)
Feverfew (*Tanacetum parthenium*)
Garlic (*Allium sativum*)
Ginger rhizome (*Zingiber officinale*)
Ginkgo (*Ginkgo biloba*)
Ginseng, Asian (*Panax ginseng*)
Onion (*Allium cepa*)
Papain from leaves and unripe fruit (*Carica papaya*)
Reishi fruit bodies (*Ganoderma lucidum*)
Turmeric root (*Curcuma longa, C. aromatica*)

fectiveness.[15] Heavy consumption may lead to elevated clotting times,[16] perioperative bleeding,[17] and spontaneous hemorrhage.[18] Numerous studies have documented garlic's irreversible inhibitory effect on platelet aggregation and fibrinolytic activity in humans, which occurs within 5 days of oral administration.[19-23] The lack of sufficient pharmokinetic data regarding garlic's elimination form the body suggests that its use should be halted at least 7 days before surgery.[11]

Ginkgo (*Ginkgo biloba*) was recognized by the 1994 German Commission E for treatment of cognitive disorders including dementia, intermittent claudication, and tinnitus or vertigo of vascular or involutional origin.[24] Although successful as a treatment for Alzheimer's Disease[25,26] and included in many geriatric vitamin supplements, ginkgo biloba has not shown any improvement in the cognitive function of healthy adults.[27] Reports of spontaneous hyphema,[28] spontaneous bilateral subdural hematomas,[29] fatal intercerebral mass bleeding,[30] and one case of bleeding following laparoscopic cholecystectomy[31] illustrate ginkgo's potential inhibitory effect on platelet activating factor and consequently on platelet aggregation.[32,33] The elimination half-lives of ginkgo's constituent terpenoids suggest that its use should be discontinued at least 36 hours prior to surgery.[11]

Asian Ginseng (*Panax ginseng*) has become popular as a key to vitality and longevity, an herb to take in cases of physical or mental fatigue or lowered resistance to infection.[34] Asian ginseng exhibits irreversible antiplatelet effects[35,36] and its concomitant use with warfarin, heparin, aspirin, and NSAIDs should be avoided.[3] Although the elimination half-life of its constituent ginsenosides is relatively short, its irreversible platelet inhibition suggests that ginseng's use should be discontinued at least 7 days prior to surgery.[11] This effect has not been shown with Siberian Ginseng (*Eleutherococcus senticosus*), which has also been promoted for its adaptogenic properties.

Ginger (*Zingiber officinale*) has been used for millennia in China as a digestive aid and to remedy stomach upset, gassy indigestion, bloating, and cramping. Recent studies have explored its use as an antinauseant in motion sickness.[37-39] Ginger is a potent inhibitor of thromboxane synthetase,[40] arachidonic acid, epinephrine, adenosine diphosphate, and collagen.[41] No cases of bleeding problems have been reported with ginger and a recent placebo-controlled crossover trial in healthy male volunteers showed no effect of 2 g ginger ingestion on bleeding time, platelet count, or platelet function 3 or 24 hours after ingestion. However, prolonged or heavy use of ginger has been reported to affect platelet aggregation[42,43] and may theoretically prolong bleeding times if used long-term.

Feverfew (*Tanacetum parthenium*), despite its name, does not have fever-reducing activity and is most commonly used for migraine prevention. Although no cases of bleeding problems in patients using feverfew have been reported, feverfew and its parthenolide constituent have been shown to inhibit platelet activity[44] and platelet aggregation.[45] Caution dictates that patients should be advised to discontinue feverfew use before surgery. However, abrupt cessation of feverfew therapy may result in a withdrawal syndrome characterized by nervousness, tension headaches, insomnia, stiffness, joint pain, and tiredness.[46]

Numerous plants contain salicylates and should be used with caution, although some authors have contended that natural sources of salicylates appear to lack aspirin's effect of inhibiting platelet aggregation.[12] These plants include Black Cohosh rhizome (*Cimicifuga racemosa*), meadowsweet flower (*Filipendula ulmaria=Spiraea ulmaria*), poplar bark and/or buds (*Populus* spp.), sweet birch bark (*Betula lenta, Betula pendula*), willow bark (*Salix* spp.), and wintergreen leaves (*Gaultheria procumbens*).[12] Other medicinal herbs such as dong quai (*Angelica sinensis* syn *A polymorpha*)[47] and danshen (*Salvia miltiorrhiza*)[48] contain coumarins and their use should be strictly avoided perioperatively (Table 1). Herbal medicines such as kava (*Piper methysiticum*), chaparral (*Larrea divaricata*),[49] and germander (*Teucrium chamaedrys*)[50] have also been associated with liver toxicity, which may lead to an altered clotting function. Finally, herbal medicines not known to cause bleeding may be adulterated with synthetic agents known to increase the risk of bleeding during surgical procedures.

Direct Cardiovascular Effects

Numerous commonly used herbal medicines may have direct cardiovascular effects.[51] Ephedra or ma huang (*Ephedra*