Beta Blockers in the Treatment of Performance Anxiety

Alice G. Brandfonbrener, M.D.

Although the ways in which the mind and body respond to stress are limited, this does not mean that similar symptoms in different individuals reflect the same underlying conflicts. The medical treatment of any symptom complex depends, in large part, upon what is believed to be the responsible pathologic condition. As universal as it seems to be, performance anxiety has different origins, meanings, and manifestations, which are as varied as the individuals in whom it occurs. Therefore, it is as meaningless to generalize about *the cause* of performance anxiety as it is about any psychophysiologic symptom. There is no single correct approach to its treatment, and the application of therapy is as complex a medical decision as is the treatment of any other syndrome. Clearly, prevention is preferable to cure for any type of medical problem, but even with the best educational techniques and the most supportive environment, performers are as unpredictable as ordinary beings and respond in an unprogrammable manner.

As is true for most symptoms of psychological origin and their management, performance anxiety and its treatment characteristically generate a great deal of emotion; everyone gets into the act, which is frequently not helpful because the feelings expressed tend to carry a judgmental load. The musician (patient) initially tends to feel guilty about having the problem, which feeling is reinforced by the strong opinions expressed by others. The guilt and the opinions are both inappropriate and counterproductive.

It is the purpose of this brief paper to be informational, and the message is not intended to be either condoning or disapproving of the pharmacologic treatment of performance anxiety. Each of the available treatments for performance anxiety and its symptoms has advantages and disadvantages, indications and contraindications. The following points are axiomatic to the treatment of all medical problems, including those that are psychological.

Dr. Brandfonbrener is Director, Medical Program for Performing Artists, Northwestern Memorial Hospital, Chicago, Illinois. Address correspondence to: Alice G. Brandfonbrener, M.D., Medical Program for Performing Artists, Northwestern Memorial Hospital, Superior and Fairbanks Court, Chicago, IL 60611.

1. Treatment(s) for each person's symptoms must be individualized to meet most closely his or her needs.
2. The treatment of psychological and psychophysiological symptoms should be prescribed by persons with suitable training.
3. The use of one mode of therapy does not preclude others, and, in fact, combined methods are frequently helpful and even essential.

SYMPTOMS OF PERFORMANCE ANXIETY

Although anxiety and fear are very much a part of the performance anxiety symptom complex, the physiological manifestations rather than the emotions per se concern us here. Rapid heart action, difficulty with breath control, and tremor are a few of the more common symptoms that may impair performance, causing musicians to seek medical help. However, these symptoms themselves produce anxiety ("Will I faint?" "Will I hit the right note?") and, in fact, add to the emotional stress that created the original symptoms. The anxiety generated by the symptoms of anxiety is frequently perceived as being more threatening than is the stress of the performance.

Historically, drugs used for treating the symptoms of performance anxiety symptoms have relied on depression of the central nervous system for their effects. "Recreational" drugs, such as alcohol and marijuana, as well as such prescription tranquilizers as diazepam (Valium) and alprozolam (Xanax), will allay anxiety, but the pharmacologic action of all of these agents is at the same time their serious flaw, at least in treating performance anxiety. They all act primarily on the brain, essentially by sedation, while secondarily reducing the body's responses and lowering anxiety. In certain circumstances, this can be both desirable and helpful, but the effect is risky for musicians and others in terms of impaired judgment, dulling of the senses, and delayed responses that accompany the sedation.

BETA BLOCKERS

Any current discussion of the treatment of performance anxiety must address the use of the class of drugs called beta

blockers, of which propranolol (Inderal) is probably the most widely known. It is a fact that propranolol can relieve many, if not all, of the symptoms associated with the performance anxiety of most people. Its widespread, if controversial, use is in itself testimony to this fact. Keeping in mind the three axioms, propranolol, when properly prescribed, is one of a number of safe therapeutic tools available to treat performance anxiety and is currently being successfully used. Like any other treatment, this medication can be abused, misused, and misunderstood.

Beta-blocking drugs are a class of drugs originally developed for, and still primarily used for, the treatment of various forms of cardiovascular conditions. They are the drug of first choice in treating a large number of patients with essential hypertension. Many musicians, however, know about propranolol through its widespread availability for managing performance anxiety. A survey conducted of the members of the International Conference of Symphony and Opera Musicians (ICSOM) indicated the use of beta-blocking drugs for the treatment symptoms of performance anxiety by 27% of 2122 respondents.[1]

Development of Beta Blockers

During the development of new classes of drugs, it is not unusual in the course of investigation to learn that they have potentially useful applications in addition to those for which they were originally designed. Such is the case with beta blockers in the treatment of diverse conditions such as hyperthyroidism, essential tremor, and migraine headaches, as well as performance anxiety. They are prescribed differently in different situations in terms of both frequency and dosage. There are important pharmacologic differences among the beta blockers, but all in all they have proved to be one of the most useful commonly prescribed classes of drugs. It takes medical judgment and experience to sort through the indications and contraindications, as with all medications. When properly used they have proved to be well tolerated and have good safety record. However, physicians must still weigh the risks and benefits before prescribing any therapy. We are aware of individual risk factors, and of the distinguishing features among the available drugs of this class. It should go without saying that the treatment of any non–life-threatening condition never justifies the use of heroic therapies.

Prescription and Restriction of Drugs

There are governmental guidelines and restrictions for all prescription drugs, and even for some over-the-counter agents, although the enforcement of these rules is uneven. Theoretically these guidelines exist to protect a vulnerable population. Most physicians prefer not to prescribe drugs for purposes that are not approved by the Food and Drug Administration (FDA), although this is within their right. Most physicians are willing on occasion to use medications for a non–FDA-approved purpose when the drug has been widely prescribed and acknowledged to be safe. Such is the case with beta blockers in the treatment of performance anxiety. However, there are clear medical as well as psychological contraindications to their prescription in specific cases. While there is ample evidence that beta-blocking drugs are and have been used inappropriately, this is also true for many other prescription and over-the-counter medications. Misuse does not preempt the judicious prescription of a medication, whether it be an antibiotic, a beta-blocker, or almost any other agent.

It is not the purpose of this paper to provide a detailed discussion of the pharmacology of beta blockers, which is covered elsewhere in this issue. What follows is a definition of some terms and a brief description of how this class of drugs may be appropriately used in the treatment of performance anxiety.

APPLICATION OF BETA BLOCKERS IN PERFORMANCE ANXIETY

In response to stress, the human body produces a number of hormonal type chemicals that act to medicate physiological responses, such as the rapid heart beat associated with anxiety. In extremely simple terms, these chemicals act like adrenalin. They attach at certain sites on cell membranes, called adrenergic receptor sites, and through these attachments chemically mediate a number of physiological responses. There are two groups of attachment sites for the autonomic (involuntary) nervous system, called alpha- and beta-receptor sites. The alpha-receptor sites deal with the contraction of smooth muscle, as in the intestines and in the constriction of blood vessels. The beta-receptor sites affect skeletal muscle (tremor), heart rate, and the dilatation of the bronchial tubes and blood vessels. To complicate matters, there are two types of beta receptors, referred to as $beta_1$ and $beta_2$. The $beta_1$ receptors have more to do with the heart and $beta_2$ with effects on the peripheral circulation and bronchi. The beta-blocking drugs compete for the adrenergic sites of the cell membranes with the adrenalin-like substances and, to the extent that they succeed, block the effect of the adrenalin, hence the name of this class of drugs.[3]

The therapeutic effects of beta blockers are partially dependent of the physiological status of the individual receiving them. Although of minimal risk in the quantities used for performance anxiety, there are potentially important hemodynamic changes associated with higher and more traditional "therapeutic" doses of the beta blockers. Therefore, because of the potential for hemodynamic changes induced by these agents, their use in treating performance anxiety in dancers is inadvisable. Therefore, this discussion focuses on the treatment of performance anxiety in musicians.

Actions and Interactions of Beta Blockers

Investigators have not been able to explain all the actions of all drugs, and this applies to beta blockers. They are

known to have a range of activities, and some members of this class of drugs are more specific in their actions on certain organs then others. Frequently, when treating cardiovascular problems, physicians opt for one of the more cardioselective beta blockers ($beta_1$ versus $beta_2$). The drugs are administered in such dosages that they have both a direct effect on the cardiovascular system and an indirect effect via the central nervous system, in ways that are not entirely understood. What is known is that certain blood levels (concentration of the drug in the blood) must be achieved to obtain a desired end-point, and if that dosage is exceeded there may be undesirable toxic side effects. Likewise, there is always the possibility of an idiosyncratic response, i.e., an unanticipated reaction to a particular drug irrespective of the dose. This includes allergic responses, which in the case of beta-blocking drugs are relatively rare. Idiosyncratic responses are different from the potential side effects of a drug that are known, although still not always predictable. For instance, this class of drugs is capable of precipitating bronchospasm in persons who are potentially asthmatic. Therefore, in situations in which there are alternatives, or in which the condition being treated does not warrant the risk, a beta blocker may not be used, even when it is the drug of first choice.

There is also the matter of drug interactions, of which patients should be generally aware but must depend on their physicians for accurate assessment. Some patients are more sensitive than others to drugs, and the optimal dosage may be substantially different for different individuals (patient size can be a factor); in other situations, the optimal dosage for the desired response may be unachievable because of negative side effects. For example, some individuals are particularly sensitive to the slowing of the resting heart rate by beta-blocking drugs before an ideal response of blood pressure reduction can be elicited. (As used in treating performance anxiety, there is only a partial reduction of the increased heart rate associated with performance anxiety, and the heart rate is still faster than the individual's normal, resting state.) Although unlikely, any adverse effect of a given medication in a therapeutic range is theoretically possible with a minimal dose as well. Patients should not share their prescriptions, but not everyone complies with this basic rule of good sense, and physicians must be alert for this possibility when evaluating adverse effects and drug interactions.

In treating the symptoms of performance anxiety with beta-blocking drugs, it is the general adrenergic effects ($beta_2$) as opposed to the more purely cardiac ($beta_1$) effects of these drugs that are desired. The aim is to moderate the autonomic nervous system's response to anxiety, which may be detrimental in performance situations (e.g., the acceleration of heart rate, increased blood pressure, the tendency for hyperventilation, dry mouth, and skeletal muscle tremors). To capitalize on this feature of the drugs, one of the least cardioselective beta blockers is selected. Figure 1 shows the mean heart rates in two groups of performers—a placebo group and a beta blocker (atenolol) group—before and during performance.

Repeated physiological observations in scientifically conducted studies confirm the efficacy of single, small doses of a beta blocker to block partially the peripheral effects of anxiety without producing the characteristic hemodynamic and other effects present with larger and more frequent doses. That is, the dose/effect relationship required to treat the symptoms of performance anxiety is often of a different magnitude from that for other conditions, such as hypertension or the prevention of migraine headaches. It has also been documented that, because these drugs are not anxiolytics, they are largely ineffective in treating pre-performance anxiety, i.e., the perception of fear and anticipatory anxiety that may result in insomnia and lack of appetite or cause disturbances even days or weeks before an event. Pharmacologically, these symptoms necessitate the use of drugs capable of sedation. The amount of beta-blocking drug used in the treatment of performance anxiety does not achieve the blood concentration necessary to cross the blood/brain barrier. Thus, although there are anecdotal reports to the contrary, carefully conducted studies of memory and

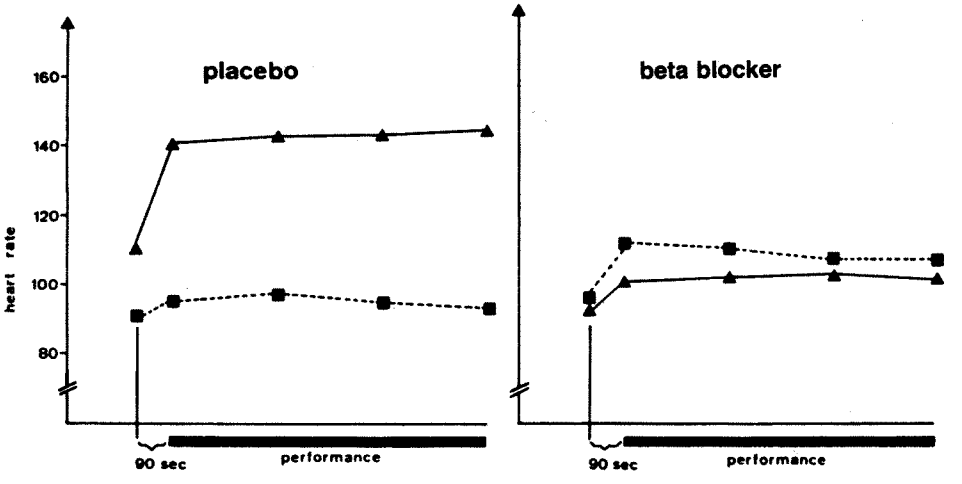

FIGURE 1. Mean heart rates in a placebo group and beta-blocker group of performers before and during performance, ▲ with ■ without an audience. (From Neftel A, et al: Beta blockers in stage fright. Psychosom Med 44:465, 1982, with permission.)

concentration in individuals taking single, low-dose beta blockers have shown no adverse effect on memory or mood but do show an enhanced ability to concentrate.[4]

Although there have been numerous studies of the beta-blocking drugs in performance anxiety, the most definitive have been carried out in Great Britain by James and colleagues,[5] and in the United States by Brantigan et al.[6] Both of these groups used instrumental musicians as subjects, and carried out a number of physiological measurements as well as performance assessments. With small variations, the studies were similar, in that measurements were made with and without drugs, with both subjects and judges unaware of whether the subjects had received beta blocker or placebo. The results indicated a moderation of the physiological manifestations of stress by the sympathetic nervous systems, with both a subjective and objective improvement in performance quality. However, in a study using vocalists, Gates et al.[7] concluded that the performance of these singers was not significantly improved with medication and that the majority of their subjects preferred not to use beta blockers.

Addiction

An issue that is frequently raised in connection with the use of beta-blocking drugs for performance anxiety is that of their addictiveness. The explanation depends on the definition of the word. Anyone may become psychologically habituated to any type of ritualistic behavior, whether or not it includes the use of a pill. In this sense, beta-blocking drugs can become a habit, as can compulsively drinking water or clearing one's throat. Physiological addiction is another story, implying not only the body's physiological need for a particular substance but also suggesting that the body may require increasing amounts of a substance to achieve a certain end-point. Although large, continuous doses of beta blockers should not be abruptly terminated, this bears no relationship to incidental uses of small amounts of these drugs as in moderating performance anxiety.[8]

I do not intend to imply that although less damaging, psychological habituation is desirable. I do not believe this nor do I believe that patients "successfully" using beta blockers for performance anxiety are enamored of the status quo. It is a question of what is at stake and what the alternatives are. Although there is an undeniably philosophical component to these questions, I believe that decisions concerning the medical treatment of performance anxiety are basically medical decisions. When treating selected musician patients with beta blockers, my therapeutic aim is the eventual withdrawal of this support when it is possible, and it frequently is. Once again, individualized treatment is key.

SUMMARY

Beta-blocking drugs, primarily propranolol, have proved to be safe and effective for many musicians as one means of temporarily controlling the negative physiological symptoms of performance anxiety.[8] For most individuals this is achieved by a single dose of 10–20 milligrams of propranolol taken 1 to 2 hours before a performance. (When I prescribe propranolol for performance anxiety, I insist that my patients take a trial dose before the anticipated event, so that the normal anxiety about possible side effects does not itself amplify the symptoms.)

Performance anxiety can be as career-damaging as it is personally disquieting. Although the symptoms tend to be similar in different individuals, the subconscious and conscious processes leading to it are highly variable. Each individual seeking treatment for the symptoms of performance anxiety must be evaluated and therapy designed to best meet his or her needs. Most patients consulting a physician for advice about performance anxiety have a long history of this problem and have previously unsuccessfully attempted a number of other coping strategies. Many treatment modalities are available, ranging from psychotherapeutic approaches, to techniques of biofeedback, to the use of medications. There are many mutually compatible ways to approach the treatment of performance anxiety, and no one method represents a panacea. Each modality has advantages and disadvantages. An anxious performer has a right to expect a consultant to be conversant with the entire range of options, or to have such information available. It is crucial that patient and therapist understand and concur with the aims of therapy and the approach that is selected. Whatever treatment is chosen, it must always be borne in mind that the attitude of the therapist may significantly influence the outcome of treatment.

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