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ABSTRACT

The booklet discusses sports adaptations for unilateral and bilateral upper limb amputees. Designs for adapted equipment are illustrated and information on adaptations are described for archery (including an archery release aid and a stationary bow holder): badminton (serving tray): baseball/softball (adaptations for catching, throwing, and batting): bowling (duckpin bowling device and an adapted bowling ball): golf: and table tennis. (CL)

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SPORTS ADAPTATIONS FOR UNILATERAL AND BILATERAL UPPER-LIMB AMPUTEES

Archery/Badminton/Baseball/Softball/Bowling/Golf/Table Tennis

by Jim Cowart

IN THIS ISSUE

Periodically a physical education teacher has a student who is missing either partially or totally one or both upper limbs enroll in a class. There is a good chance the student has been, or is being, fitted with a prosthesis, or two protheses in the case of a bilateral arm amputee, to provide substitutes for lost functions. For the most part unilateral arm amputees can participate in almost all activities offered in general physical education programs. In some sports, such as softball, a prosthesis will be of assistance to the participant; in other activities--e.g., contact sports--prosthetic devices may have to be removed to avoid risks of injuries to all concerned. The few activities requiring modification for unilateral upper-limb amputees as well as most sports for bilateral arm amputees cause concern on the part of many physical education teachers. Instructors feel unsure, for example, in archery, whether or not they can adequately meet special needs of these students. Feelings of inadequacy are primarily due to lack of experience in working with students who are missing one or both upper limbs.

This Practical Pointer offers examples of adaptations that have been developed for use by unilateral and bilateral upper-limb amputees in a few selected sports--archery, badminton, baseball/softball, bowling, golf, table-tennis. For two sports--golf and baseball/softball--no adaptations are included for bilateral arm amputees because at present none tried have proven useful or effective. All modifications reviewed emphasize use of the individual's prothesis, thus offering a student additional opportunities to improve ability to control his/her terminal device. Specific details regarding construction of teacher-made adaptations are not included. However, reference is made to sources of such information. In addition, names and addresses of companies manufacturing commercial items are noted.

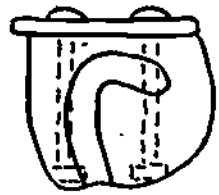
Once again we are indebted to Jim Cowart, Alameda Independent School District (Hayward, California), who has unselfishly shared his creative ideas and innovations through the Practical Pointer series. Adaptive devices of the type presented in regular physical education, recreation, and sports programs and activities realities. Least restrictive environment and most normal setting feasible become more than words in laws; equal opportunities are available to everyone regardless of type and severity of handicapping conditions; focus is truly on abilities. In making necessary accomodations a matter of course, Jim Cowart exemplifies Robert F. Kennedy's admonition--"Some men see things as they are and ask, 'Why?' Others dream that which is not and ask, 'Why not?'"

Pictorial collages in this publication are original drawings by Jane Silverman Bradtke, AAHPER/IRUC Information and Materials Assistant, to whom thanks and appreciation are extended.

ARCHERY

Unilateral Upper-Limb Amputations

A number of approaches have been taken to assist unilateral arm amputees participate in archery. Selection of adaptions has often been by student choice and functional abilities as well as availability of materials. Review of a few archery adaptions follows.



Archery Release Aid

Illustration #1

Archery Release Aid (3:5). One student preferred to hold an archery bow with his normal hand since he felt that he had greater bow control. A release aid was made to fit his prosthetic hook which allowed him to pull and release the bowstring. This method worked well because this student had effective control of his remaining stump and attached prosthesis.

Stationary Bow Holder (5:79). Another approach to providing a one-armed pupil opportunities to participate in archery was through constructing a stationary bow holder. Two pieces of copper tubing were clamped to an archery bow, one piece of tubing above and the other below the bow handle. The other end of each piece of pipe was inserted into separate holes in a vertical wood standard. To stabilize the bow holder for outdoor use the standard was inserted into a concrete mold that had been sunk into the ground. For indoor use the holder was inserted into the base of a volleyball standard and fastened to the gymnasium floor. This arrangement supports the bow in an upright position. The single-handed person is then able to pull and release the bowstring with his/her normal hand without using the other arm.

Bow Held with Artificial Hand. A rather interesting adaptation makes use of an artificial hand. An archery bow grip/handle is adjusted to fit a Robin Aid Hard Hand. (1) When the individual wants to get involved in archery, he/she removes his/her conventional hook and replaces it with the artificial hand. By activating the fingers of the terminal device, the archer is able to grip the bow firmly. This modification allows an amputee to pull the bowstring with the normal hand.

Accru-Hook System (2). A new commercially-made terminal device available for purchase--the Accru-Hook System--may make it easier for amputees to be more successfully involved in a variety of sports, including archery. The hook looks much like a conventional hook except it has an opening in the stationary finger of the hook. In the case of archery, an adaptor post can be fastened to the side of the archery bow. The post is then slipped into the opening in the stationary finger and automatically locked firmly into place. This allows the bow to become an extension of the prosthesis to provide bow control and stability. The normal hand can then be used to pull and release the bowstring. The locking level can easily be released to permit quick removal of the bow.

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[1] Information obtained through personal conversation with Mr. Robinson, Robin Aids Prosthetics, 3353 Broadway, Vallejo, California, 94590.

[2] For additional information related to the Accru-Hook System, write Pope Brace, 197 South West Avenue, Kankakee, Illinois, 60901.

Bilateral Upper-Limb Amputations

An adapted bow recently made for a bilateral arm amputee seems to be a promising modification. The limb with the prosthesis which holds the archery bow had missing only the hand, wrist, and a portion of the forearm. As a result, this student could hold the bow steady and securely. The release aid (see Illustration #1, page 3) was held in the other prosthetic hook and used to pull the bowstring. With use we will better know if the adapted bow proves to be as useful and effective as it presently seems to indicate.

The commercially made Accru-Hook System (see page 3) seems to offer a very effective method of attaching an archery bow to one of the prosthetic devices of a bilateral upper-limb amputee. A release aid can then be held and used in the pupil's other hook.

Adapted Archery Bow

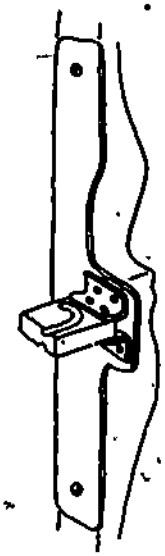
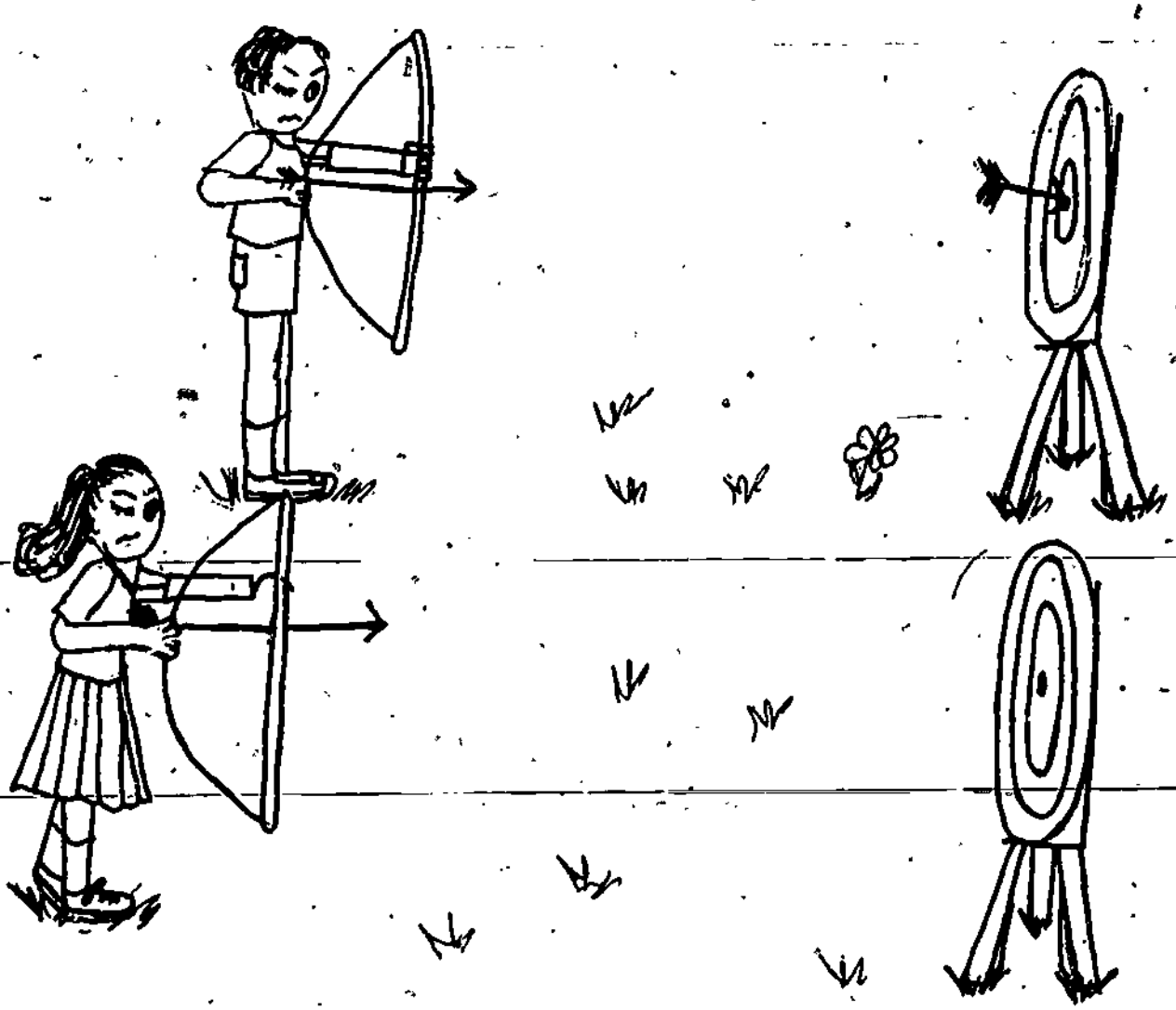


Illustration #2



BADMINTON

Unilateral Upper-Limb Amputations

The unilateral arm amputee can play badminton with his/her normal hand. Except for serving, few adjustments are necessary. Two satisfactory modifications related to serving are discussed below.

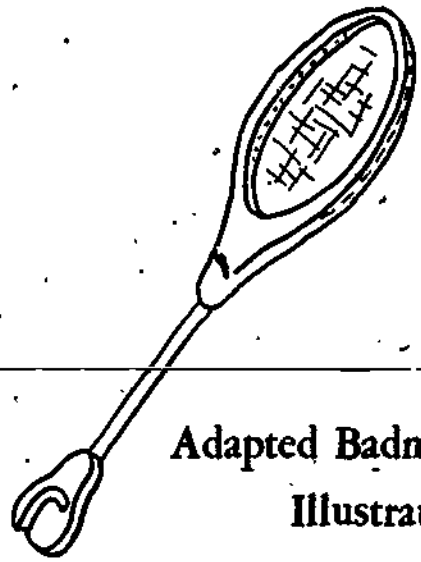
Use of Hook. One approach is for the student to pick up the shuttle with his/her hook. When ready to serve, the individual places the shuttle on the strings of the racket which is held in the normal hand. Next the player lifts the racket upward projecting the bird into the air and then strikes it using the same underhand stroke that able-bodied students use.

Serving Tray (1:159). Another technique makes use of a serving tray. The tray consists of a base to hold the shuttle, a handle that is gripped by the individual, and a cuff to secure the device firmly to the student's prosthesis. To serve the shuttle, the student places it on the tray, lifts and rotates the prosthesis which releases the bird. The racket is then brought forward with the normal hand to hit the shuttle with an underhand stroke.

Bilateral Upper-Limb Amputations

An adapted racket made badminton a realtiy for a student with congenital amputations of both upper limbs. A badminton handle was constructed so that it could be gripped with one of the student's hooks. As a consequence of the adapted racket, this individual developed ability to rally with an underhand stroke on a reduced playing area (3:12).

Coming up with an effective serving technique for a bilateral arm amputee was a real challenge for both teacher and student. The approach that was proven somewhat effective was the first serving technique discussed earlier for unilateral arm amputees (see above). The student retrives the shuttle with the free hook, places the bird on the racket face, quickly lifts the prosthesis and projects the bird into the air, and then hits it using an underhand stroke. This approach requires a good deal of muscle control and timing.



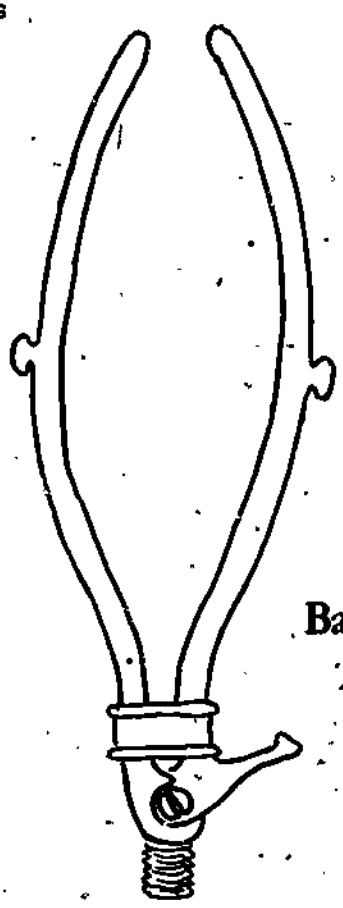
Adapted Badminton Racket
Illustration #3

BASEBALL/SOFTBALL

Unilateral Upper-Limb Amputations

Baseball and softball are two of the more popular sports that one-arm young people seem to enjoy playing. Adaptations that may be necessary for a single-handed individual center around catching, throwing, and batting. Successful modifications of these skills that have been made for and used by some students follow.

Catching. Some short below-elbow amputees have been fitted with a special baseball/softball glove attachment for their prostheses. One device made by Hosmer/Dorrance (3) is shown in Illustration #4. This adaptation is designed to offer a gripping action in the thumb and forefinger of a glove. Small knobs on the extended fingers assist in holding the glove to the fingers.



Baseball Glove Attachment

Illustration #4

Robin Aids Prosthetics (4) also makes a baseball/softball glove attachment that differs from the Hosmer/Dorrance terminal device in both design and principle. The Robin Aids' attachment includes four fingers. These fingers are first inserted into the gloves' fingers and thumb holes. Once the glove is in position on the terminal device, an effective glove pocket can be shaped by the normal hand so that the individual is ready to catch a ball.

Other one-arm amputees prefer to use the baseball/softball glove on their normal hands. This works well for catching but may present problems in securing the ball to throw. Most of these individuals after catching the ball simply toss it six to eight inches into the air, take the glove off and place it under the stump or opposite arm pit, grab the ball, and make the throw. This procedure is used when catching fly balls or in fielding bunts or ground balls.

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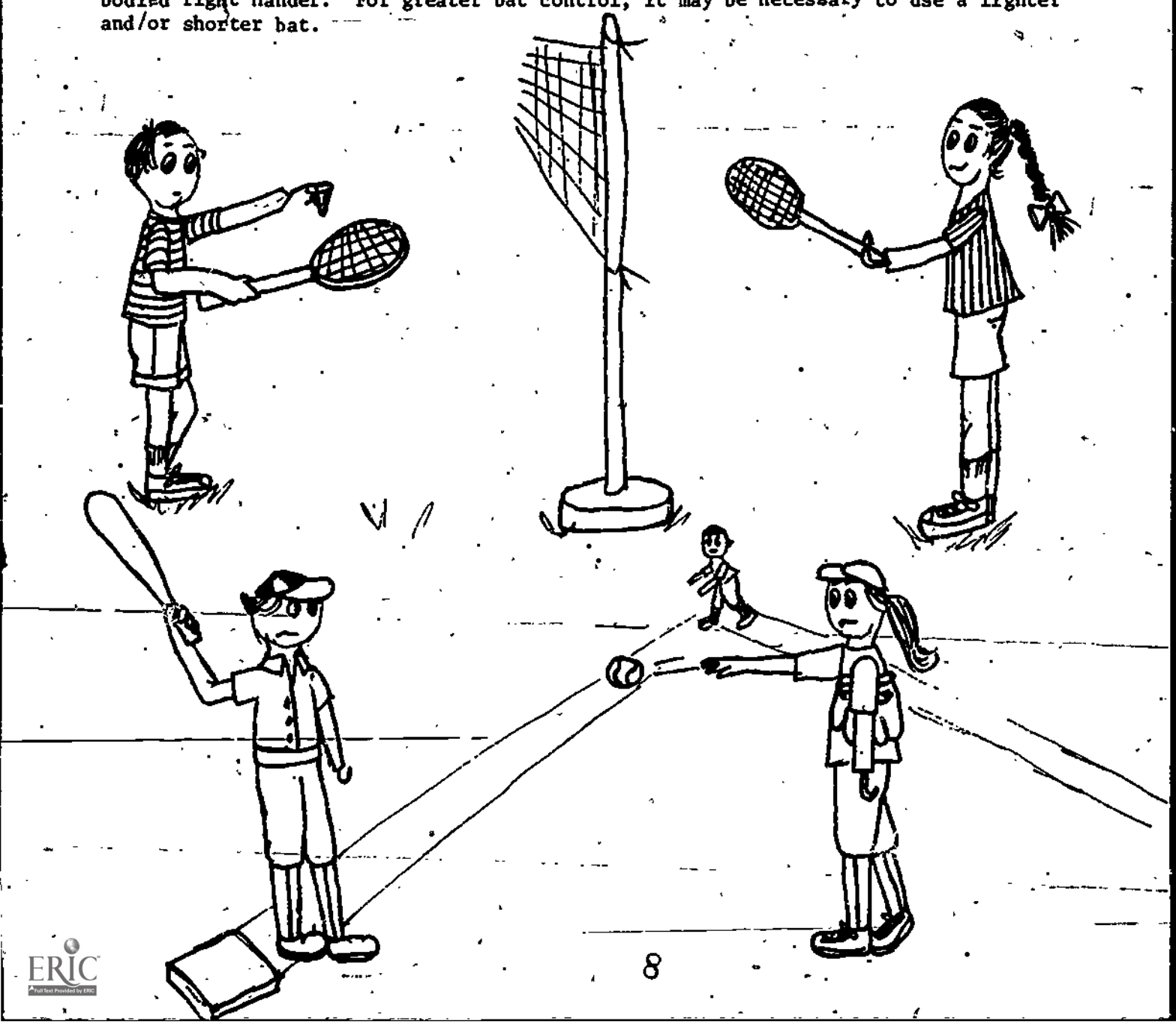
[3]Hosmer/Dorrance Corporation, 561 Division Street, P. O. Box 37, Campbell, California, 95008. Your local dealer in medical supplies will probably have a Hosmer/Dorrance equipment catalogue.

[4]Information from Mr. D. Schroeder, Robin Aids Prosthetics, 3353 Broadway, Vallejo, California, 94590.

Throwing. Throwing by a unilateral upper-limb amputee who wears a baseball/softball glove over a terminal device is much like that of an able-bodied individual. Once the ball is caught in the glove, simply remove the ball with the normal hand and make the throw.

Two practical techniques single-handed players use to remove a ball from a glove on their normal hands so as to make throws with the same hand follow. One method consists of tossing the ball into the air with the glove hand, shaking the glove off the hand, immediately catching the ball while it was still in the air, and then making the throw. A second method is to place the glove with the ball in its pocket under the opposite arm and then slip the hand out of the glove so the ball remains in the glove. Then the ball is removed from the glove and the throw made.

Batting. A one-armed student can bat using the remaining arm. If the normal arm is the right, the batter positions him/herself at the plate much like an able-bodied right hander. For greater bat control, it may be necessary to use a lighter and/or shorter bat.



BOWLING

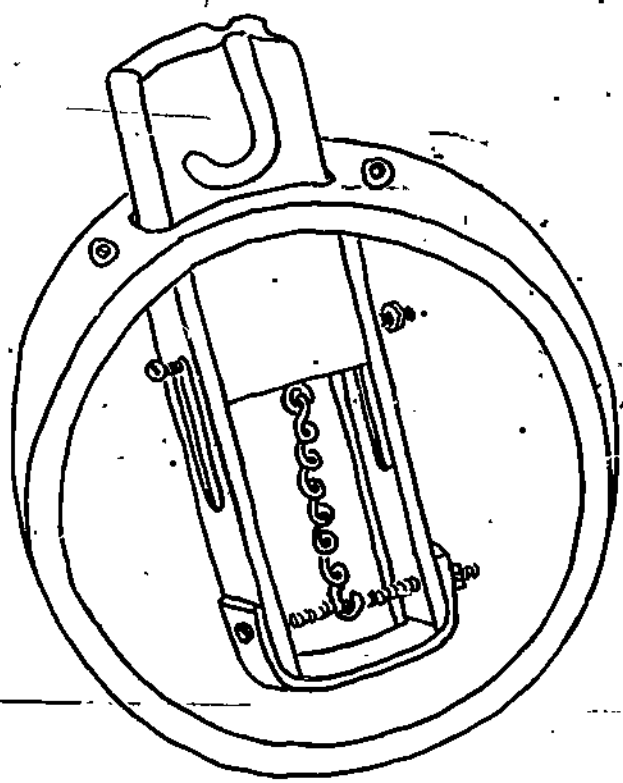
Unilateral Upper-Limb Amputations

Bowling is an activity in which a single-handed individual can achieve considerable success. The only recommendation generally made is that the student wear his/her prosthesis to help develop body balance and coordination in executing bowling skills.

Bilateral Upper-Limb Amputations

Four bowling adaptions for bilateral arm amputees will be discussed. The firat is a modification of the rubber Safe-T-Play bowling ball used by teachers in school gymnasiums, in cafeterias, on playgrounds, and in classrooms. The second device was developed to hold a duckpin bowling ball. The laat two bowling adaptations were made for use with regulation bowling balls; one is teacher-made and the other manufactured commercially.

Adapted Safe-T-Play Bowling Ball (2:6). Safe-T-Play bowling is a popular activity in many secondary schools. An adapted Safe-T-Play bowling ball waa created for a atudent with a congenital bilateral upper-limb amputation. The ball has two unique characteristica. The first is a handle which the student can easily hold, freely swing, and conaistently release. The aecond feature is that its handle retracts into the ball when releaaed thus allowing for a somewhat noiay but straight roll. The purpose for its construction was to provide a apecific individual with opportunities to participate in activities enjoyed by peers.



Adapted Safe—T—Play Bowling Ball

Illustration #5

Duckpin Bowling Device (4:13). A hospital ataff, recognizing rehabilitative values of coordinating recreational activities with treatment procedurea, created an effective device ao that a bilateral arm amputee could enjoy duckpin bowling. Two key items used in constructing the appliance included a auction cup and a tire valve-stem asaembly. The device waa supported on the atationary finger of the hook in auch a manner that when the moveable finger waa opened it hit a release lever that depreaaes the valve-stem. To operate the terminal device the individual pressed the suction cup firmly against the ball to create a aufficient vacuum to

support the ball. In turn, the ball was released by simply opening the hook which broke the vacuum in the suction cup thus freeing the ball to roll.

Bowling Scoop (6:79). A bowling scoop was constructed to assist a bilateral arm amputee deliver a regular bowling ball. The scoop was secured to one of the student's prosthetic devices with velcro straps in combination with an eyelet into which the top of the hook was inserted. After securing this device to the prosthesis the bowling ball was slid into the placement section of the scoop and tilted back. The arm without the scoop was placed under the scoop for additional support. To release the ball, the individual bend at the knees and waist and tilted the scoop down toward the floor so that the ball rolled forward.

Bowling Attachment. Hosmer/Dorrance (5) makes a terminal appliance that can be used to hold and release a regular bowling ball. The main feature of this aid is a sleeve that is normally under constant tension which results in an expanded position. The sleeve can be made thinner by the same action used to activate a conventional hook. To place the sleeve into the finger hole of a bowling ball, the individual simply activates the control cable which stretches the sleeve; the sleeve is then inserted into the hole. On releasing tension on the cable controls, the sleeve expands resulting in a firm grip on the ball. To release the ball, the individual again causes the sleeve to stretch.

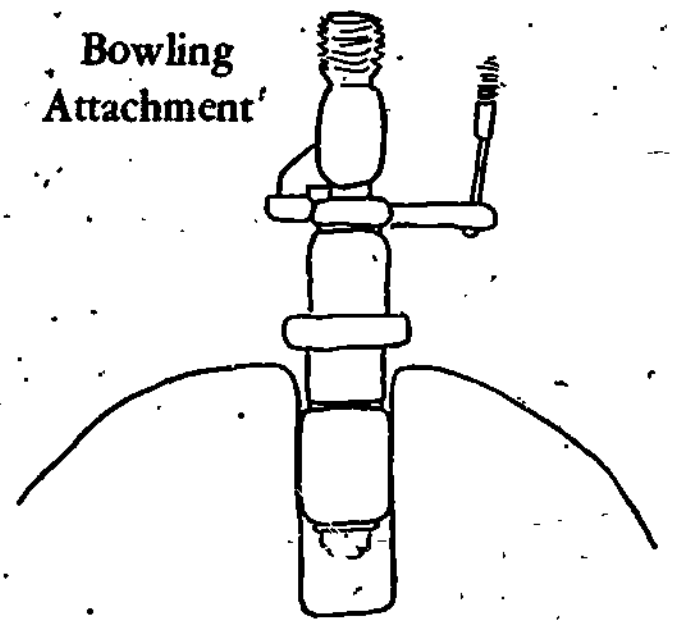


Illustration #6

[5] Hosmer/Dorrance Corporation, 561 Division Street, P. O. Box 37, Campbell, California, 95008.

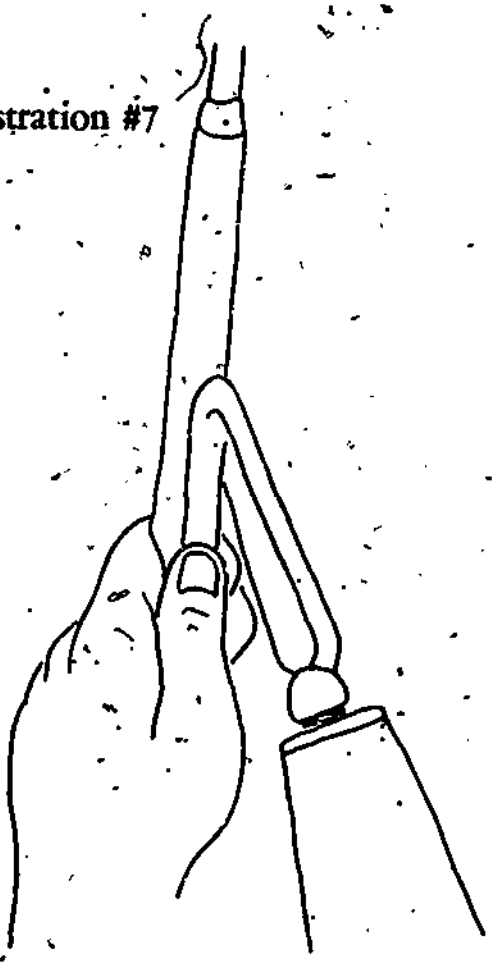
GOLF

Unilateral Upper-Limb Amputations

Golf is another sport in which a one-armed person can successfully participate. Right-handed individuals--or left-handed--differ as to whether left or right-handed clubs should be used. Some right-handers use a right-handed club and play forehanded while other choose a left-handed club and play backhanded--vice versa for left-handed persons. Personal preference seems to be the deciding factor in club selection.

Robin Aids Prosthetics (6) has developed a terminal device that may be used by below-elbow amputees to add addftional club control and stability.

Illustration #7



Golf Aid

[6]Information from Mr. D. Schroeder, Robin Aids Prosthetics, 3353 Broadway, Vallejo, California, 94590.

TABLE TENNIS

Unilateral Upper-Limb Amputations

Table tennis is an activity in which one-armed amputees can achieve high levels of proficiency and readily compete with able-bodied peers. As with badminton, the only modification that probably needs to be made is in serving techniques. One approach used by a single-handed student was to hold the paddle with little finger, ring finger, and forefinger. The thumb and middle finger were used to grasp the ball. To serve, the individual simply tossed the ball into the air with an upward motion of the forearm while releasing the ball. The individual was then able to execute a legal serve.

Bilateral Upper-Limb Amputations

A bilateral upper-limb amputee desired to participate in table tennis. Wishing to encourage this student in developing skills in this recreational activity, a table tennis paddle was made as shown in Illustration #8. He was able to rally the ball successfully using the adapted paddle (3:14). However, the one area where an effective technique has not been developed is serving. Presently, if the ball is out of play on the amputee's side of the table or floor, he simply hits or kicks the ball to his opponent who does all the serving. In spite of an inability to serve, this individual over the last two years has become extremely proficient in playing table tennis.

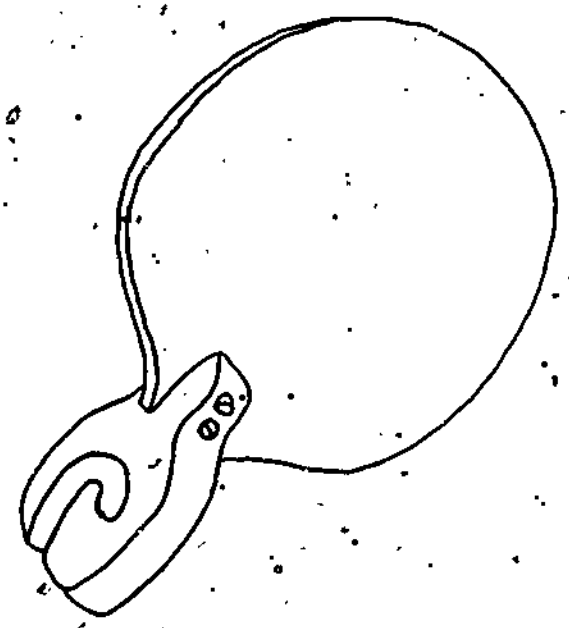
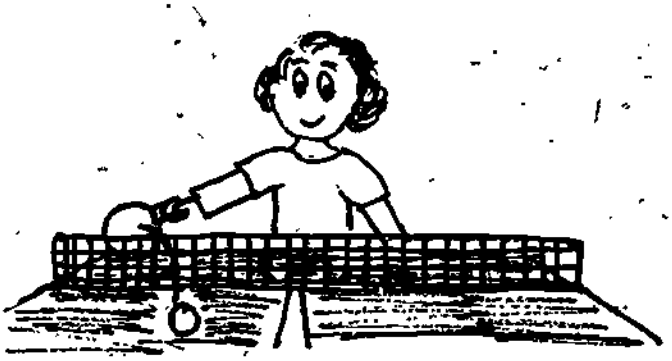


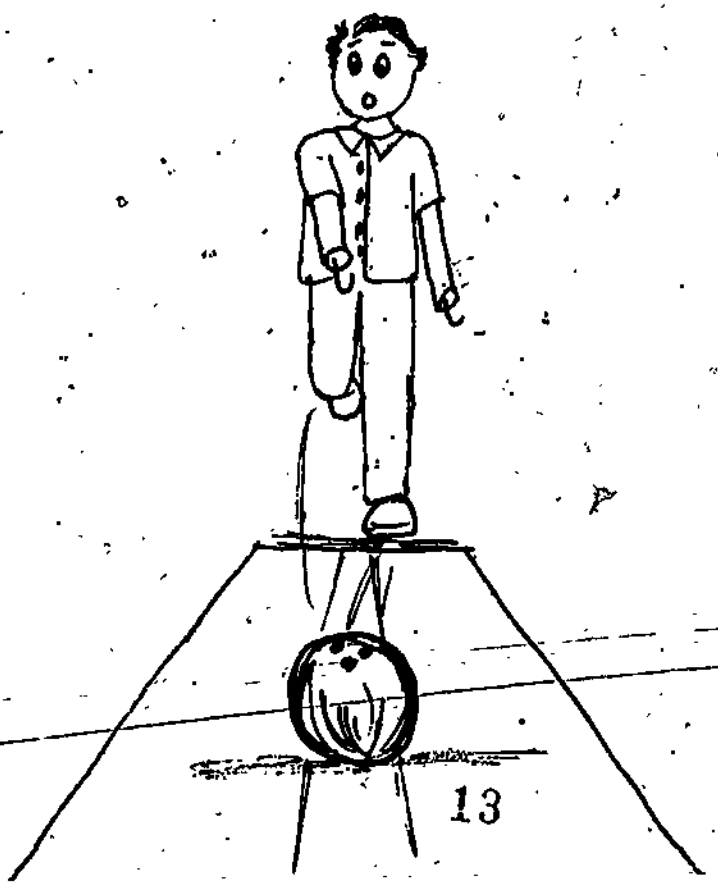
Illustration #8 Adapted Table Tennis Bat

SUMMARY

An attempt has been made to broaden the readers' backgrounds of adaptations that have been created by others to assist unilateral and bilateral upper-limb amputees have successful and satisfying experiences in a variety of physical education, recreation, and sport activities. With such information, it is hoped instructors will have a base of knowledge to expand activity horizons of upper-limb amputees who may presently be in their classes.

NOTE: Readers are encouraged to send information about adapative devices and other modifications that enable students with different handicapping conditions to participate actively in various physical education, recreation, and sport activiites. Send your innovative approaches and creative ideas to AAHPER/IRUC, 1201 Sixteenth Street, N. W., Washington, D. C., 20036.





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